Modes of Supply Strategy Making: An exploration of functional strategy process

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Abstract

This thesis is an empirical exploration of supply strategy content and process. The investigation uses a single-sector case study methodology to explore the scope of supply strategy content, the interaction between supply strategy content and context, and supply strategy process within four aerospace sector companies. The research also uses an extant *Integrative Framework* to subsequently identify the 'modes' of supply strategy process that best describe supply strategy process in the case studies.

While the scope of supply strategy content suggested by the supply management literature is theoretically broad, supply strategy process is represented in the literature as chiefly derived from business / corporate strategy. Recognising that details of the processes / practices that create supply strategy and the scope of content within supply strategies have been under-explored empirically, this investigation seeks to contribute to a developing understanding of supply strategy content and process 'in practice' and in particular, the role of actors in supply strategy process - which is largely absent in related studies.

The research contributes to existing knowledge by finding that the opportunity / autonomy actors have to enact supply strategy process is broadly determined by contextual factors. Furthermore, the investigation finds that supply strategy process, actors *and* context all have a moderating effect on the scope of supply strategy content. It is also shown that different actors engage in the formulation and implementation stages of strategy process. Finally, the investigation identifies one dominant 'mode' of supply strategy process and distinctive combinations of 'secondary' modes in each case study.

For practitioners, this investigation illustrates that the opportunity and facility to think / act strategically in supply is dependant upon more than just resolve and motivation; it is the product of a complex interaction of strategy context, content, process *and* actors. The thesis concludes by making a number of recommendations for practice and by identifying opportunities for further research in this field.

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List of Abbreviations

B2B	Business to Business
CAA	Civil Aviation Authority
CAC	Chinese Aircraft Corporation
CEO	Chief Executive Officer
FAA	Federal Aviation Administration
FTSE	Financial Times Stock Exchange
IMP	Industrial Marketing and Purchasing Group
IT	Information Technology
ITAR	International Traffic in Arms Regulations
MIT	Massachusetts Institute of Technology
MPS	Master Production Schedule
MRO	Maintenance, Repair and Overhaul
OS	Operations Strategy
OTIF	On Time In Full
PIN	Product Introduction Team
RBV	Resource Based View
RFP	Request For Price
SBU	Strategic Business Unit
SCM	Supply Chain Management
SCO	Supply Chain Organisation
SME	Small and Medium-sized Enterprises
SSP	Strategy Structure Performance
SWOT	Strengths, Weaknesses, Opportunities, Threats
TCE	Transaction Cost Economics
VP	Vice President
VPOSC	Vice President of Operations and Supply Chain
VPSC	Vice President Supply Chain

Chapter 1.

Introduction

Chapter 1. Introduction

A typical firm of the 1950's would have placed little emphasis on co-operation with suppliers (Tan, 2001). In the 1960's few executives would have made the link between improved procurement practices and competitiveness (Trent and Monczka, 1998a). However, by the 1980's - with increased global competition for the acquisition of resources, markets and talent (Cousins and Spekman, 2003a) - supplier relationships and alliances with complimentary organisations had become strategic issues for firms (Lamming et al., 2004), so that today the ability to move production and sourcing around the globe is viewed as a key source of competitive advantage for multi-national, outsourced and networked businesses (Womack and Jones, 1996).

The conceptualisation of 'supply' co-evolved with the progressive developments in supply practice. From what was once simply 'buying' and 'material-handling', the conceptualisation of 'supply management' emerged from three broad streams of literature. First, the purchasing literature - concerned with the contracting principles of procurement. Second, literature concerned with the operational management of material and information flows and finally, literature concerned with the relationship and interaction between buyers and sellers.

Located within the broad terrain of 'supply management' is the topic of 'supply strategy'. Relative to corporate strategy very little attention has been dedicated to 'functional' strategies in general - such as marketing or manufacturing strategy – and to supply strategy in particular. Though a growing number of authors have recognised the significance and potential of supply strategy, the field remains relatively unexplored (Cousins and Spekman 2003; Harland et al. 1999). Moreover, even less research has been committed to understanding how functional strategies actually 'come about' (Barnes 2002; Nollet et al. 2005). In the supply literature, for example, supply strategy process is generally presented as a direct reflection / extension of corporate / business strategy (Anderson and Katz 1998; Monczka and Morgan 2000) and consequently, specific rich detailed descriptions of the actual (i) scope of *content* that constitute supply strategies, and (ii) *processes*, transactions and actors that create supply strategy, are very rare. Without a solid empirical grounding, supply strategy theory development is inevitably also restricted. It is this 'gap' that provides the underlying motivation for this research.

The purpose of this thesis is therefore to contribute an understanding of supply strategy process and content 'in practice' and the role that actors play in supply strategy; a perspective that has largely been ignored in previous studies.

1.1 The Focus of the Investigation

This thesis reports the details of an empirical exploration of supply strategy content and process.[1] Specifically, the research is guided by two questions. First, the investigation considers the relationship between the scope of the theoretical supply strategy 'content' literature and empirical practice, and also addresses whether the context in which a supply strategy is embedded has a moderating effect on the scope of supply strategy content 'in practice'.

RQ 1. What is supply strategy content 'in practice'?

- *What is the scope of supply strategy content?*
- *What is the nature of the interaction between supply strategy content and context?*

Second, the research focuses on the investigation of empirical supply strategy process. Specifically this encompasses the processes and transactions of supply strategy process, the role of actors engaged in these 'activities' and the conceptual approach to supply strategy process taken by organisations / practitioners.

RQ 2. What is supply strategy process 'in practice'?

- *What activities are involved?*
- *Who are the actors that engage in supply strategy process?*
- *How is supply strategy process approached conceptually?*

1.2 Background to the research

To explore both supply strategy content and process 'in practice' - a single-sector case study methodology was selected for its suitability in the empirical exploration of 'real-life' phenomena (Yin, 2003). Four organisations were chosen for study from the aerospace sector; these represented (ex-ante) an appropriate mix of contrasting characteristics in a technologically advanced but relatively 'stable' sector, featuring complex supplier relationships and therefore, the likelihood of rich case material.

[1] Supply strategy *process* is the manner in which supply strategy 'comes about' and is implemented. It concerns how supply strategy is (or should be) 'made', who is involved and when these activities take place. Supply strategy *content* is the 'result' or 'product' of supply strategy *process* activities; i.e. *'the strategy itself, with all its specific characteristics'* (De Wit and Meyer, 2004).

The objective of RQ 1 – *to classify the scope of supply strategy content and the interaction between supply strategy content and context* - could be relatively simply satisfied by conducting semi-structured interviews and examining documents / other case artefacts, representing the 'content' of supply strategy *and* the 'context' in which each of the case study organisations is embedded.

Accordingly, approximately 650,000 words of transcribed interviews were 'uploaded' into NVivo data analysis software and analysed for data representing supply strategy 'content' and 'context'. The 'content' data was then compared / contrasted with the reported breadth of the supply strategy literature (Carter and Ellram 2003; Croom et al. 2000; Rungtusanatham et al. 2003) - see Figure 1 below – and the 'context' data was scrutinised to consider any 'evidence' that 'context' has a moderating effect on the empirical scope of supply strategy content.

Strategic Supply Management
Strategic Networks
Control in the supply chain
Time-based strategy
Strategic Sourcing
Vertical integration
Make-buy / lease-buy / outsourcing
Core competencies focus
Supply network design
Strategic alliances
Strategic supplier segmentation
World-class manufacturing
Strategic supplier selection& performance evaluation
Global strategy
Capability development
New product development

Logistics
Integration of materials & information flows
JIT, MRP,waste removal, VMI
Physical distribution
Cross docking
Logistics postponement
Capacity planning
Forecast information management
Distribution channel management
Planning & control of materials flow
Inventory & production management
Transportation

Relationships / Partnerships
Relationship development
Supplier development
Strategic supplier selection
Vertical disintegration
Partnership sourcing
Supplier involvement
Supply / distribution base integration
Supplier assessment (ISO)
Guest engineering concept
Design for manufacture
Mergers, acquisitions, joint ventures
Strategic alliances
Contract view, trust, commitment
Contracting & contract management
Partnership performances
Relationship marketing
Supply chain issues (i.e.beyond dyadic relationships)
Quality issues
Legal & regulatory issues
Certification

Best Practice
JIT, MRP, MRP II
Continuous improvement
Tiered supplier relationships
Supplier associations
Leverage learning network
Quick response time, time compression
Process mapping, waste removal
Physically efficient versus market orientated supply chains
WWW /e-commerce
Computer applications & EDI

Organisational Behaviour
Communication
Human resource management
Employee relationships
Organisational structure
Power in relationships
Organisational culture & learning
Technology / knowledge transfer
Ethics
Social responsibility
Education

Purchasing
Strategic purchasing
Purchasing strategy & strategic impact
Capital equipment purchasing
Government, academic, institutional purchasing
Healthcare purchasing
Evaluating purchasing performance
International / global purchasing
Services purchasing
Purchasing organisation, teams, & internal relationships
Buyer behaviour
Negotiations
Competitive bidding
Cost / price analysis
Cost reduction

Figure 1. The theoretical scope of the supply strategy content literature

The application of a conceptual framework

To focus the investigation of RQ 2 – *supply strategy process 'in practice'* – a framework was brought into play to bridge the conceptualisations of strategy process in the mainstream business / corporate strategy literature and the role played by actors in supply strategy

process – i.e. their place in the organisation, the activities involved in formulating and implementing supply strategy and the routines and procedures that shape process activity.

The framework (below) - *an Integrative Framework for Strategy Making Processes* (Hart 1992) – is constructed around the strategy making process typologies in the business / corporate strategy process literature (e.g. Ansoff 1988; Bourgeois and Brodwin 1984; Mintzberg 1973; Mintzberg and Waters 1985) and the varying roles that top managers and organisational members play in the strategy making process. Illustrating the interaction of process and actors, the framework presents five 'modes' of strategy making processes:

- *Command*: in which a strong leader or small leadership team design strategy and push it down into the organisation
- *Symbolic*: in which leaders articulate a vision that guides the actions of organisational members toward goals
- *Rational*: in which top managers determine strategic direction through formal planning processes that require structured organisational member involvement
- *Transactive*: in which strategy emerges through transactions among organisational members, suppliers, customers and other stakeholders
- *Generative*: in which central direction gives way to internal entrepreneurship and top management adjust strategy to fit innovations that emerge from below

Descriptors	**Command**	**Symbolic**	**Rational**	**Transactive**	**Generative**
Style	*(Imperial)* Strategy driven by leader or small top team	*(Cultural)* Strategy driven by mission and a vision of the future	*(Analytical)* Strategy driven by formal structure and planning systems	*(Procedural)* Strategy driven by internal process and mutual adjustment	*(Organic)* Strategy driven by organisational actors' initiative
Role of Top Management	*(Commander)* Provide direction	*(Coach)* Motivate and inspire	*(Boss)* Evaluate and control	*(Facilitator)* Empower and enable	(Sponsor) Endorse and support
Role of Organisational Members	*(Soldier)* Obey orders	*(Player)* Respond to challenge	*(Subordinate)* Follow the system	*(Participant)* Learn and improve	*(Entrepreneur)* Experiment and take risks

Table 1. An integrative framework for strategy making processes (Hart,1992)

The *Integrative Framework* consequently enabled the operationalisation of RQ 2 by facilitating the exploration of supply strategy process at multiple levels in the organisation,

linked to an explanation of the role of actors. The ‘modes’ also provided a means to capture for study, rich data on the interaction between actors and supply strategy process, prompting the development of a supplemental stream of enquiry for RQ 2:

- *Which mode(s) best describe supply strategy process?*

1.3 The Contribution of the Research

1 There is a misalignment in the supply management literature in which the representation of supply strategy ‘content’ is in excess of that likely to be addressed by supply management practitioners. This reflects a failure in much of the literature to take sufficient account of context; which is significant, as supply strategy ‘content’ needs to be understood in the light of the context in which the supply strategy is to be realised. Likewise, the supply strategy ‘process’ literature has not gone far enough in incorporating a breadth of conceptual resources, nor has it sufficiently explored the ‘actual’ activities of supply strategy process and the actors engaged in it.

2 The opportunity / autonomy that actors have to enact supply strategy process is broadly determined by contextual factors. This study identifies three such sets; particular conditions within the sector, the peculiarities of supply markets and the background of senior actors.

3 A more contingent view of supply strategy process is needed, reflecting that although much of the supply management literature has sought to understand supply strategy by reference to its content, it has done so without an appreciation of the moderating effect of strategy process, actors *and* context on content. The investigation identifies a ‘negatively reinforcing cycle’ that illustrates the interaction of these three factors and their impact on the autonomy of actors to act strategically.

4 Supply strategy process - in the organisations studied - does not generally engage the same actors in the formulation *and* implementation stages of strategy process. This validates the use of actors as a key variable in the analysis of supply strategy process and also affirms, that the analysis of functional strategy process should be understood to embrace an investigation of both the formulation of strategy *and* its implementation.

5 The research identifies ‘Command’ as the most dominant ‘mode’ of supply strategy process. While this is largely a reflection of the impact of context on supply strategy process, it is also the dominant ‘choice’ of mode. Furthermore, choice also plays a part in the adoption of ‘secondary’ modes of supply strategy process.

6 While there are no observations of a sequential progression from one ‘mode’ to another in the organisations studied, patterns are discernable in the combination of the modes the organisations deploy. A pattern is also observed in the application of analytical tools to tactical supply decisions, while senior actors rarely utilise analytical tools in long-term strategic decisions.

1.4 The Structure of the Thesis

This chapter has introduced the background to the research and the research questions that guided the investigation. To enable the reader to subsequently navigate more easily through the content of the thesis, however, this section presents an outline of the structure of the document.

Chapter 2. Literature Review. This chapter begins by locating ‘supply strategy’ within the broader terrain of the ‘supply management’ literature and outlines how the ‘supply strategy’ literature was identified using a three-stage process. The resulting literature review is divided broadly into two sections; the first comprising articles that address the ‘content’ of supply strategy leads to the development of RQ 1. The second, smaller section that is concerned with supply strategy ‘process’ required consideration of the conceptual resources from the corporate / business strategy process literature and the adoption of Hart’s *Integrative Framework for Strategy Making Processes* in order to operationalise RQ 2.

Chapter 3. Research Philosophy and Methodology. Chapter 3 considers theoretical research paradigms and perspectives before locating this study in the post-positivist research paradigm. The chapter subsequently explains the rationale underpinning the selection of the single-sector / multiple case study methodology, and how reliability and construct / internal / external validity were addressed at each stage of the research process. Finally, the chapter explains the criteria used in the selection of the four case studies, the principles adopted for data collection and the analytical strategy that guided the analysis of the case data.

Chapter 4. Case Studies. Four case studies – ‘A’ to ‘D’ – are presented based on 78 interviews with 66 participants. Each case is presented using the same structure to facilitate

cross-case comparisons. First, a brief description of each case is given together with details of the interviews conducted with the organisation. Next, supply management practice within the case is explained, followed by an exploration of supply strategy process. Finally, an account is given of the scope of supply strategy within the case.

Chapter 5. Cross-Case Analysis. This chapter compares and contrasts the data in the case studies - using the themes in the research questions - to generate research findings. The chapter begins by analysing data relating to RQ 1 – i.e. the content of supply strategy and the interaction of content and context across the cases. Subsequently, data relating to RQ 2 – i.e. the activities, actors and approaches to supply strategy process – is similarly analysed leading to consideration of the 'modes' of strategy process identified in the case studies.

Chapter 6. Discussion of the Research Findings. Using *'Supply Strategy Content and Context'* and *'Supply Strategy Process and Actors'* as the two main section headings, this chapter reflects on the research findings and in particular, specific points of divergence between the extant literature and actual supply strategy practice.

Chapter 7. Research Conclusions. This chapter develops six conclusions based on the discussion of the research findings. These are summarised in Section 1.3 (above) as the main contributions of this research. Chapter 7 also discusses the implication of the findings for practice and identifies the limitations of this research, along with propositions for extending this research.

1.5 Chapter Summary

This chapter has introduced this thesis by presenting the focus of the investigation; the background to the research; an outline structure of the document and a summary of the contributions of the research. The next chapter – Chapter 2 - presents a review of the significant literature.

Chapter 2.

Literature Review & Research Questions

Chapter 2. Literature Review

This chapter summarises the extant conceptual resources relevant to addressing the research objective introduced in the Introduction. Unsurprisingly, a focus on *the process and content of supply strategy* necessarily locates the problem on the much broader terrain of supply management. As a result, before presenting the detailed review of the supply strategy literature and refining the specific research questions that guide the empirical components of the work (section 2.2. outlines the literature review method, section 2.3. is supply strategy content, and section 2.4. is supply strategy process), section 2.1. briefly sets supply strategy in its supply management context. Moreover, the relative paucity of supply strategy process literature meant that additional literature was subsequently reviewed (Section 2.4) in order to operationalise this question and include the role of 'actors' in supply strategy process. This led to the development of an integrative research framework and a supplemental question, regarding 'modes' of supply strategy process.

2.1. An Overview of Supply Management

The detailed conceptual antecedents of supply management are myriad but can be broadly collated into three literature streams: purchasing, supply chain management and inter-organisational relationships.[2]

Purchasing

Initially perceived as little more than a clerical function, the strategic importance of purchasing within the firm began to be recognised in the 1970's; a decade that marked the start of dynamic changes in key markets, such as oil. It was acknowledged at this time that purchasing could play an important role in monitoring and interpreting the meaning of these trends, funnelling information into the firm's strategic decision-making process (Pearson and Gritzmacher, 1990). From these beginnings the purchasing literature of the late 1970's and 1980's developed a concern with the importance and competitive potential of the purchasing function to the success of the firm (Browning et al., 1983, Burt and Soukup, 1985, Caddick and Dale, 1987, Carlson, 1990, Farmer, 1976, Landeros and Monczka, 1989, Spekman, 1981, Reck and Long, 1988). However, by the early 1990's only limited 'achievements' had been made in gaining greater strategic involvement for the purchasing function (Ellram and Carr, 1994b), even though the obstacles to progress were well mapped (Farmer, 1981, Spekman and Hill, 1980, Van Weele, 1984). Nonetheless, during the 1990's awareness of

[2] Others have argued that supply chain management literature is based on the (a) logistics and transportation and (b) purchasing and supply literature (Tan 2001).

the competitive and strategic importance of the purchasing function gradually grew (Carter and Narasimhan, 1996a, Carter and Narasimhan, 1996b, Spekman et al., 1994) and a focus on purchasing's contribution to the strategy and performance of the firm has since continued in the literature (Cavinato, 1999, Farmer, 1997, Ferguson et al., 1996, Krause et al., 2001, Mol, 2003, Carr and Pearson, 2002, Carter, 2005, Dong et al., 2001, Paulraj et al., 2006, Schiele, 2007). En route, the purchasing literature has sought to keep pace with and incorporate developments in production techniques such as Lean Manufacturing (Hines, 1996, Lamming, 1993). Even so, a concern with the principles of purchasing, such as the development and use of purchasing portfolio models, has remained the bedrock of many purchasing texts (Baily et al., 2004, Gelderman and van Weele, 2005, Monczka et al., 2005, Van Weele, 2002, Kraljic, 1983).

Supply Chain Management

Although the interaction between flows of information, materials, manpower and capital equipment was identified as crucial to the success of industrial companies over forty-five years ago (Forrester, 1961), the logistics literature has traditionally paid limited attention to the behavioural and psycho-sociological aspects of business activities; for example, how actors in a supply network might resolve conflict or come to decisions (Harland et al., 1999). Its focus is instead on the operational management of material and information flows in and around facilities (Thomas and Griffin, 1996). The term 'supply chain management' (SCM) was introduced into the supply literature in the 1980's (Oliver and Webber, 1982). Once introduced, the label was evident in relatively few journal articles between 1985 and 1995 (Giunipero et al., 2008) but finally gained momentum in the late 1990's (Lambert et al., 1998), with the number of SCM related journal articles increasing significantly after 1995 (Rungtusanatham et al., 2003). The specific definition of SCM has been much debated (Berry et al., 1994, Cavinato, 1992, Christopher, 1992, Cooper and Ellram, 1993, Cooper et al., 1997, Ellram, 1991, Kopczak, 1997, Lee and Ng, 1997, Lummus and Vokurka, 1999, Mentzer et al., 2001, Novak and Simco, 1991, Oliver and Webber, 1982, Saunders, 1995, Scott and Westbrook, 1991, Tan et al., 1998, Thomas and Griffin, 1996, Towill et al., 1992) and, as a result, the term is used inconsistently (Harland, 1995). Indeed new and/or modified definitions continue to be proposed (Burgess et al., 2006). Although the literatures now associated with SCM encompass strategic management, marketing, organisational behaviour, etc., the enduring focus on operational aspects of supply leads much SCM research to be essentially descriptive and a-theoretical (Croom et al., 2000, Burgess et al., 2006). Indeed, it has been argued (Mills et al., 2004) that theoretical development is limited to demand amplification/the bullwhip effect (Forrester, 1961) and ideas on postponement

(Bucklin, 1965). In fact, SCM scholars frequently base their ideas of SCM on theories from other fields, such as transaction cost economics (Burgess et al., 2006).

Inter-organisational relationships

The inter-organisational relationship perspective on supply management, concerned with the behaviour of actors within networks of supply, is mostly associated with the work of the Industrial Marketing and Purchasing Group (IMP). Formed in 1976 by researchers in five European countries, the IMP Group's approach is founded on the importance of understanding the interaction between active buyers and sellers in continuing business relationships (Gadde and Hakansson, 2001). The Group's first project was a large-scale comparative study of industrial marketing and purchasing across Europe published in 1982 (Hakansson, 1982). The study regarded buyer-seller relationships as patterns of interactions between two actors and highlighted the active nature of both parties, challenging the notion that one party to a transaction is active while the other is merely a passive agent. What is supplied is often complex and necessarily co-developed by the buyer and seller; bringing difficulties, doubts and particular capabilities to the relationship (Gadde and Hakansson, 1994). The IMP Group has since become an informal, international network of researchers who continue to adopt the interaction-approach as the foundation of their research, taking the relationship as their unit of analysis (Moller and Rajala, 2007, Moller and Svahn, 2006, Ritter and Gemunden, 2003, Gadde and Hakansson, 2001, Ford et al., 2003). Research into the diversity of supply relationships has asserted that there is no single ideal type relationship and importantly, that a relationship can only be understood as part of a complex network of other relationships (Ford, 2004). Controversially, IMP research has concluded that networks cannot be managed and instead that the actors within networks merely cope (Hakansson and Snehota, 1995). According to this view, the paradox of a supply network is that companies within the network are not free to act according to their own aims or to circumstances as they arise. The more a company attempts to achieve control of a network, the less effective and innovative it will be (Hakansson and Ford, 2002).

Table 1 (overleaf) summarises these three perspectives:

Perspective	Indicative Definition	Notable Authors	Focus
Purchasing	Directing all activities of the purchasing function toward opportunities consistent with the firm's capabilities to achieve its long-term goals (Carr and Smeltzer, 1997)	Carter, CR Farmer, D Monczka, RM Spekman, R	Focused on purchasing's contribution to the strategy and performance of the firm and concerned with the principles & practices of purchasing
Supply Chain Management	All the activities involved in delivering a product from raw material through to the customer including sourcing raw materials and parts, manufacturing and assembly, warehousing and inventory tracking, order entry and order management, distribution across all channels, delivery to the customer, and the information systems necessary to monitor all of these activities (Lummus and Vokurka, 1999)	Cooper, MC Ellram, LM Lummus, RR Narasimhan, R	Grounded in the field of logistics and focused on operational aspects of supply. Covers a broad terrain of literature, although there is a lack of theoretical development, so it is common for theory from other fields to be imported
Relationship	Business exchange cannot be understood as a series of disembedded and independent transactions of given resources – but rather as complex relationships between buying and selling organisations, where what is exchanged is created in interaction (IMP Group)	Ford, D Gadde, L-E Hakansson, H Snehota, I	Concerned with the behaviour of actors within networks of supply rarely addressed in the other literature streams. Taking the 'relationship' as their unit of analysis, research is mostly associated with the IMP Group

Table 2. The conceptual antecedents of 'supply management'

2.2. Supply Strategy Literature Review Method

A review of academic research between 1997 and 2006 found supply strategy to be the most discussed topic in SCM literature. The review of 405 articles in nine academic journals categorised 95 of the articles (23 percent) as relating to supply strategy (Giunipero et al., 2008). Adopting Giunipero et al's methodology as the basis for a literature review, this thesis conducted an initial search for supply strategy literature using a similar three-stage process.

1. In stage one of the initial literature search (data collection), instead of the phrases 'supply chain management' and 'supply chain' used by Giunipero et al, the terms 'supply chain strategy' and/or 'supply strategy' (including plurals) were substituted. These phrases were searched for in the title and abstract of journal articles within three journal databases: Business Source Premier, Emerald and Web of Knowledge. Business Source Premier located 57 matches with the title of journal articles and 155 matches in abstracts. Emerald located 30 matches with titles and 88 in abstracts. Web of Knowledge located 121 matches with titles.

2. In stage two (content analysis) the references were reviewed to identify duplicate articles and articles whose titles clearly related to other fields, e.g. Russia's energy supply strategy. The duplicate and irrelevant references were discarded, leaving 189 journal articles. All of these were entered into an Endnote reference database to facilitate further data manipulation. The 189 references were reviewed again to remove any that, on closer examination, related to topics other than supply strategy. Articles were kept in the review unless clearly not concerned with supply strategy. This process reduced the number of references for analysis to 140.

   In addition to the primary literature search, additional searches were undertaken on the same three journal databases using other search phrases, reflecting the antecedent literature themes for supply management. Once again, the search phrase(s) was sought in the title and/or the abstract of the article. Search phrases used included *logistics strategy* (221 results); *purchasing strategy*, *procurement strategy, buying strategy* (415 results); *relationship strategy and supply, marketing strategy and supply*, *Industrial Marketing and Purchasing Group, IMP* and *IMP Group* (221 results). To double-check that articles by known key authors in the field had been captured by the literature search, additional supplementary searches were also conducted on key author names, e.g. Kraljic, Hakansson and Gadde, etc. The process of content analysis was repeated on all these articles. This resulted in a further 89 articles being added to the 140 from the initial search; i.e. a total of 229 supply strategy articles for inclusion in the literature review.

3. Finally, in stage three (categorisation) each of the articles was given a classification of 'E' if it was an empirical paper, or 'N' if it was a non-empirical paper. For most articles this distinction was clear-cut; case studies had been undertaken or purely theoretical constructs had been developed. In a few cases the classification was more ambiguous, however. For example, a theoretical model had been developed which was illustrated using examples from industry (Zinszer, 1996), or a conceptualisation was proposed accompanied by a Delphi study to validate the features of the concept (Harland et al., 1999). For clarity, unless there was explicit evidence of a connection between a concept in an article and a case, the article was deemed to be non-empirical. Each article was also given a classification relating to the subject matter of the paper. Articles that broadly addressed what supply strategy is (i.e. descriptive articles) were given a classification 'C' (for 'content'). Alternatively, articles concerned with how supply strategy is - or should be - formulated were given a classification 'P' (for 'process'). The 229 references were then grouped together into

a table for each classification (CE; CN; PE; PN) and ordered by year of publication.

Methodologically, 60.2 percent of the articles are empirically based and 39.8 percent are conceptual / non-empirical articles. The ascendancy of empirical studies in this review mirrors the dominance of empirical studies found in the SCM literature (Croom et al., 2000). 44 of the articles or 19.2 percent have 20 or more citations, but only ten articles have 50 or more citations, suggesting that supply strategy is a specialist topic within the broader field of supply management. Thematically, 77.7 percent of the articles in the review address what supply strategy is – i.e. the 'content' literature - and only 22.3 percent of articles focus on how strategy comes about – i.e. the 'process' literature.

In addition to this three-stage process, the literature search also included the subsequent checking of references cited in key journal articles (e.g. Barnes, 2002; Harland et al, 1999; Pettigrew, 1992) and the inclusion of newly published material, using the Zetoc Alert service to obtain automatic email notification of new articles in key journals.[3] As a result, the literature reviewed in this thesis spans - in total - the period 1937 to 2010 (Coase, 1937, Oltra and Flor, 2010).

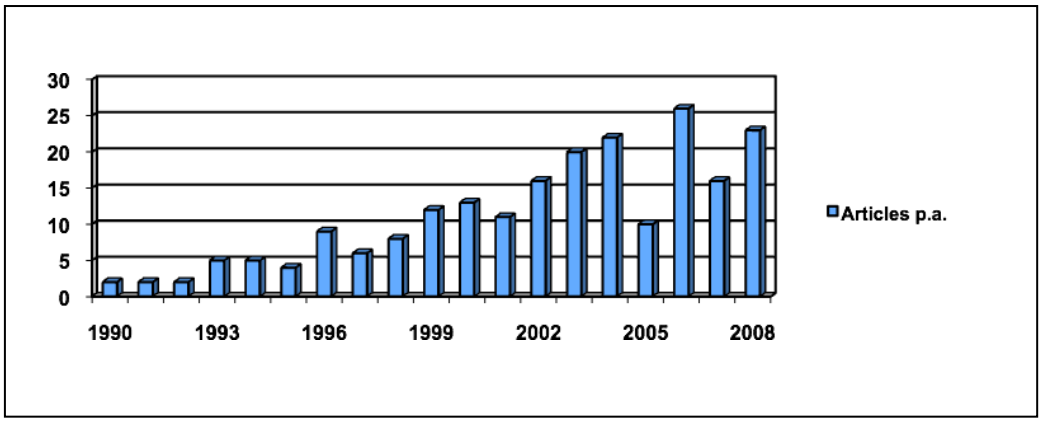

Figure 2. The number of supply strategy articles by year of publication

An analysis of the literature reveals a marked rise in supply strategy articles beginning in the late 1990's (see above). This rise coincides with the increase in SCM articles (Rungtusanatham et al., 2003) that also occurred around this time. Although the increased is marked it should be noted, however, that the overall number of supply strategy articles

[3] Zetoc provides access to the British Library's database of around 20,000 journals and 16,000 conference proceedings published per year.

published each year is still quite small, not exceeding 26 in any year. This observation for supply strategy corresponds with the broader observation that relative to the number of articles that address corporate strategy, very little academic attention has been dedicated to understanding functional strategy (Nollet et al., 2005b, Barnes, 2002).

The next part of the literature review presents the supply strategy 'content' literature (Section 2.3), followed by the supply strategy 'process' literature (Section 2.4). Each of the sections is presented in three parts. First, articles that construct definitions in the literature are presented, then theoretical development is discussed and finally, the contribution of fieldwork is investigated.

2.3 Supply strategy content

The supply strategy content literature consists of 178 articles (77.7 percent) of the total 229 articles reviewed. These articles are not concerned with the manner in which supply strategy comes about; instead this literature addresses various aspects of what supply strategy *is or should be* for the firm.

A defining characteristic of the supply strategy content literature is its breadth. To cite some contrasting examples, Holweg (2005) develops a conceptual model of key factors that determine the responsiveness of a supply chain, while Baker (2004) uses survey data to determine the extent to which modern supply theory and distribution centres are aligned. Van der vorst et al (2004) explore hybrid supply strategies and the decoupling point in a poultry supply chain experiencing high demand uncertainty in an inflexible production environment, while Wei and Chen (2008) model how transaction costs can be used in the selection and implementation of purchasing strategies in different scenarios. Consequently, while the specifics of the supply strategy content literature are explored in the subsequent sections, the scope of the literature is also a point of departure for considering whether empirical supply strategy practice actually embraces the breadth of content presented.

Definition

A sub-set of the 'content' literature is concerned with questions of definition, i.e. a focus on classifying supply strategy, tracing previous research studies and encapsulating supply strategy for future study. Typologies and taxonomies are frequently used for classifying aspects of supply strategy. These span firm-level logistics activities (Autry et al., 2008), the evolution of logistics organisations and structures (Bowersox and Daugherty, 1987), selecting global supply strategies (Christopher et al., 2006), the identification of logistics

strategies used in North America (Closs and Clinton, 1997), analysing the consequences of size asymmetry in customer-supplier relationships (Johnsen and Ford, 2008), SCM strategies used by US firms and their relationship with performance (Narasimhan et al., 2008), the selection of a market specific supply strategy using a taxonomic approach (Christopher and Towill, 2002) and a proposed taxonomy for supply integration strategies based on the contingencies of supply network coupling and extended enterprise systems architecture in the supply chain (Moller, 2006). Other authors attempt to illustrate supply strategy by segmenting strategies by product, brand and retail channel drivers (Brun and Castelli, 2008) or by the benefits sought and the features available from a given supply strategy (Canever et al., 2007). Methodologically, mathematical models have been used to study buying strategies (Morris, 1959) and in contrast, qualitative accounts have been made of the empirical characteristics of supply strategy (Brun et al., 2008, Godsell et al., 2006).

The literature suggests that within supply management, academics have been attempting to define supply strategy's conceptual boundaries and its links to corporate strategy. The definition of supply strategy adopted by this thesis is a conceptualisation born out of an exploration of subject boundaries including operations management, purchasing and supply management, industrial or relationship marketing and logistics, within the context of the emerging global economic environment.[4] Several articles explore previous research and the literature on topics that aggregate to form supply strategy, often as the basis for consideration of future research opportunities. An article from the early 1990's differentiates between what had been traditional systems of supply and new supply chains, highlighting the implications for purchasing and supply strategy (Cooper and Ellram, 1993). Another article reviews the purchasing strategy literature from the 1970s to the 1990s, differentiating between types of purchasing strategy and identifying key issues facing purchasing practitioners (Ellram and Carr, 1994b). A reflective article toward the end of the 1990's describes the changes that had affected supply management in the US during the decade. It considers the trends and how the requirement for improved corporate performance had enhanced supply strategies and activities (Trent and Monczka, 1998b).

In the last decade, articles have discussed the historical evolution of SCM and supply management's growing importance to corporate strategy (Lummus and Vokurka, 1999,

[4] A decision was taken to avoid the use of an existing definition of supply strategy at the outset of this research. As an inductive study of strategy content and process it was considered more appropriate for a definition of supply strategy to evolve from the research findings, rather than to limit the research within the bounds of an ex-ante definition. In any event, it was notable that existing definitions focussed principally on defining supply strategy by reference to 'content' above 'process'. The decision to avoid the use of an existing definition was subsequently validated by the findings of the research (i.e. contingency, context sensitivity, actors, mode), as none of the definitions available ex-ante would have addressed all of these factors.

Lummus and Demarie, 2006). One such includes an analysis of 37 studies published between 1996 and 2003 focussing on global supply chain strategies, the internationalisation of operations and its managerial implications (Ahlstedt and Hameri, 2004). The future of purchasing and supply management is considered in an analysis of previous empirical studies (Zheng et al., 2007), while another investigates how supply strategy in a public sector organisation changed during the course of a single longitudinal research programme (Walker et al., 2008). Variously, academics take a subjective view that a firm's perception of the strategic nature of supply is dependant upon how the firm defines its competitive advantage within the marketplace (Cousins, 2005), propose frameworks to analyse and describe strategies (Cigolini et al., 2004, Wisner, 2003), or theoretically match distinct supply strategies to particular phases of supply chain development (Stonebraker and Afifi, 2004). The literature even features a description of a course on supply strategy offered at MIT's Sloan School of Management, intended for senior practitioners and general managers (Fine and Simchi-Levi, 2007). Given the breadth of the antecedent literature relating to supply management and the relatively recent conceptualisation of the field, however, it is understandable that such diverse attention has been brought to bear on defining the boundaries of supply strategy.

Theoretical development

It has been reported that supply management is still emergent in terms of theory and practice, with few practitioners able or genuinely seeking to operate across extended networks of supply as proposed by much recent literature (Storey et al., 2006). Even so, limited theoretical development has taken root in supply management. For example, the theory of delayed product differentiation known as postponement (Bucklin, 1965) is used to develop ideas in a number of supply strategy articles. These include developing and implementing a postponement strategy (Heskett, 1977, van Hoek et al., 1999), analysis of the effects of postponement on supply chain relationships (Waller et al., 2000), discussion of the managerial implications of postponement (Graman and Magazine, 2006), complementary strategies for managing supply-chain integration including mass customisation, postponement and modularisation (Mikkola and Skjott-Larsen, 2004) and a re-evaluation of supply from a postponement perspective, including implications for the decoupling point, supply integration, managerial control and capacity planning (Yang and Burns, 2003). It is argued (Mills et al., 2004) that postponement and the theory of demand amplification known as the 'bullwhip effect', which asserts that demand amplification back along a supply chain is inevitable if member organisations are unaware of each other's stock-holding (Forrester, 1961), represent the totality of theoretical development in supply management – despite Forrester's background in systems dynamics. It is in fact, far more common for academics to

locate supply strategy research in theories taken from other fields of study. Nonetheless, although comprehensive theory has not emerged from within the field of supply strategy, various explorative, conceptual frameworks have been put forward in the literature. We will briefly consider a range of these concepts before returning to review the main theories found in supply strategy originating from other fields. For ease of explanation, the explorative concepts are divided into two groups focussing on strategic and operational topics respectively.

The link between supply management and its status within the firm, as determined by supply's involvement in corporate strategic planning and its contribution to the firm performance, surfaced in relatively early supply management research (Farmer, 1972, Farmer, 1976, Farmer, 1981, Spekman, 1985) and again in the 1990's, as companies began to recognise the need to incorporate supply strategy into the firm's overall planning process (Lummus et al., 1998). Supply's strategic importance and its role in enhancing the competitive performance of the firm has since remained a theme in the supply strategy literature (McAfee et al., 2002, Veselko and Jakomin, 2008, Gardner and Cooper, 2003). As the development of supply strategy became a more important managerial issue and strategic 'levers' were identified that supply practitioners could use to improve a firm's chances of success (Carter and Narasimhan, 1996a), various concepts and frameworks were developed to attempt to strengthen the links between supply strategy, business strategy and performance. This review identified a framework for assessing the alignment between corporate and supply strategy, built on the generation of rents as its common denominator (Knudsen, 2003). Another article suggests the concept of the product life cycle as a potential 'common strategic denominator' for integrating corporate strategy and supply strategy (Birou and Fawcett, 1997). Product life cycle is also emphasised as an important concept in the formulation of supply strategy (Jackson Jr and Ostrom, 1980, Rink, 1976).

From an early analysis of purchasing and its potential contribution to the performance of a firm's logistics system (Davis, 1973) there has been a growing recognition in the literature that the supply strategy employed by the firm can have a significant impact on performance and shareholder value. This concept and the related organisational framework of 'value based management' are used to explore connections with supply chain strategy (Christopher and Ryals, 1999). Others speculate on the role that actors (Ayers, 1999, Collyer, 2001), capital equipment (McGrath, 1999), customer service / quality (Morash, 2001) and geographic location (Suhaiza and Premkumar, 2005) play in supply chain efficiency and profitability; themes that are subsequently brought together to provide a rich conceptualisation of the relationship between supply management, the strategy of the firm

and the link with firm performance (Day and Lichtenstein, 2006). Arguing that previous conceptualisations[5] are too simplistic, it asserts instead that the inter-relationship between supply practice and the strategic orientation of the firm – as represented by the typology 'prospector', 'analyzer', 'defender' or 'reactor' (Miles and Snow, 1978) - is complex but provides an opportunity to measure the true impact of supply practice on firm performance.

The second grouping of normative concepts clusters together articles that are concerned with operational aspects of supply strategy. Frameworks are abundant in this literature. They include a systematic framework for the strategic sourcing of services and materials (Anderson and Katz, 1998) and a framework focusing on different sourcing approaches, the selection of suppliers in simple contracts, price and lead-time reduction in commodity-type purchases and the use of strategic partnering strategy (Hadeler and Evans, 1994). Three further frameworks are each concerned with uncertainty in supply management. In the first, the 'supply chain complexity triangle' describes the interaction of deterministic chaos, parallel interactions and demand amplification and provides the basis for a framework for understanding the generation of uncertainty (Wilding, 1998). The other two frameworks speculate on how uncertainty in supply might be mitigated through effective supply strategy design (Rodrigues et al., 2008, Roh et al., 2008). Various concepts are also considered within the context of supply strategy. For example, two papers consider the application of 'lean' and 'agile' constructs in supply management. The first approaches lean and agile as distinct models of business operations and attempts to reconcile and combine them (Towill and Christopher, 2002). The second paper also seeks some combination of the constructs, arguing that to be effective supply strategy must be equally lean and agile (Harris, 2004). Further examples of concepts in the 'content' literature are summarised in Appendix 1.

Returning to the location of theories taken from other fields of study in the field of supply strategy, three theories are prominent in the literature: the theory of transaction cost economics 'TCE' (Williamson, 1979), the resource-based view of the firm 'RBV' (Wernerfelt, 1984), and the strategy-structure-performance paradigm 'SSP' (Rumelt, 1974). The influence of each of these is considered in turn, in order of – arguably - their relative prominence in the literature.

Transaction Cost Economics

Transaction costs are those incurred in carrying out any economic transaction between firms or within the firm, for example between stages of production. Broadly, such costs are

[5] For example - (Das and Narasimhan, 2000)

classified as information costs, negotiation costs and monitoring or enforcement costs (Hobbs, 1996). According to TCE theory, the properties of a transaction determine the organisation of the firm, i.e. whether a market, hierarchy or alliance governance structure is the most efficient for a given transaction (Williamson, 1975). Four factors produce transactional difficulties and underpin transaction costs. The first two, bounded reality and opportunism, are behavioural assumptions. Bounded reality refers to the cognitive boundaries that mean that while aiming to make a rational decision, an actor's capacity to evaluate all the alternatives is limited. This is a particular factor in complex and uncertain situations. Opportunism or self-seeking with guile (Williamson, 1979), is the risk that an actor or firm will seek to exploit a situation to their advantage, such as in small numbers bargaining where a powerful supplier may act opportunistically to alter the terms of a business relationship. The third factor information asymmetry, recognises that one party in a transaction may have access to more information than the other, which they may use to act opportunistically. These difficulties and costs increase as transactions become more infrequent, uncertain and asset specific (McIvor, 2009). The fourth factor, asset specificity, is the investment of resources in a transaction that have little or no alternative value. TCE asserts that opportunistic behaviour is more likely if an exchange requires one or both parties to make a highly transaction specific investment, for example, in the development of a product unique to one market. While uncertainty and frequency are also important variables in the constitution of the governance structure, asset specificity is regarded as the most critical with high asset specificity being theoretically (Williamson, 1981) and empirically (Rindfleisch and Heide, 1997) linked to hierarchical governance.

TCE is frequently imported into the broader supply management literature (Carter and Rogers, 2008, Johnson et al., 2007c, Wang and Wei, 2007, Williams et al., 2002, Williamson, 2008, Holcomb and Hitt, 2007). Within the supply strategy content literature, TCE is used to develop three normative models. The first combines the concept of e-supply management with TCE, RBV and network theory to form a model for analysing supply chains and reducing uncertainty in the formulation of supply strategies. The resulting model (e-SOM) is proposed as a means of formulating optimal, executable strategies for specific supply chains (Kotzab et al., 2003). In the second model, TCE is considered in the development of a model to assist actors in understanding what supply strategies to follow and what relationships to adopt. It suggests that firms that define their competitive advantage as cost-focused will generally consider supply as having a passive and supportive cost-reduction role in the firm. Alternatively, firms that perceive their competitive advantage as being secured through differentiation will perceive supply as having a strategic role, i.e. a distinctive capability. This viewpoint is proposed to encourage the exploration of links

between the firm's competitive position and priorities for supply (Cousins, 2005). The final paper models how transaction costs can be used in the selection and implementation of purchasing strategies in different scenarios. It also seeks to identify how to reach a break-even point between transaction cost and agency cost (Wei and Chen, 2008).

Resource Based View

RBV is widely utilised in supply management literature (Carter, 2005, Hult et al., 2007, Hult et al., 2006, Wang and Wei, 2007, Wu et al., 2006, Holcomb and Hitt, 2007). Notably, Holcomb & Hitt (2007) is contained within a special edition of the Journal of Operations Management (25, 2) focussing on organisational theory and supply chain management. In addition to RBV, the special edition features papers on the knowledge-based view of the firm (Miles & Snow), agency theory (Morgan et al), institutional theory (Rogers et al), game theory (McCarter & Northcraft) and others. The antecedents of RBV and TCE in theories of the firm can be traced back over 70 years (Coase, 1937, Penrose, 1959) but the appropriateness of the analysis of the firm by resources (inputs) rather than by product or market classification (outputs) came to the fore in the mainstream strategy literature in the 1980's (Wernerfelt, 1984). At this time RBV developed as an alternative perspective for thinking about the strategy of the firm, at odds with the then dominant positioning school (Porter, 1980, Porter, 1985) which argued that only a few strategies or positions in the marketplace are desirable in a given industry. These are strategies or positions that can be defended against existing and future competition. In contrast RBV asserts that it is possible to identify types of resources that can lead to higher profits (rents) and reintroduces the notion that actors make strategic decisions, which was largely overlooked by the positioning school. Although currently one of the most widely applied perspectives of strategy for the firm, its applicability in supply strategy has been debated.

RBV theorists assert that sustainable competitive advantage cannot be generated from purchased assets (Conner, 1991, Dierickx and Cool, 1989) or that while all the conditions necessary to prevent purchasing activities from generating competitive advantage may never apply, their breach is only ever short-lived or slight (Ramsay, 2001). Empiricists counter this view citing significant evidence that supply has made a major contribution to the competitive advantage of the firm (Mol, 2003). Two further articles illustrate the application of RBV within supply strategy. The first tests three different theoretical lenses on the interaction between information, physical flow and the complex motivations that drive the evolution of supply chains. These are RBV, the concept of complex adaptive systems (Holland, 1995) and adaptive structuration theory (De Sanctis and Poole, 1994). The article finds that each theory has a separate sphere of applicability, while remaining complimentary to each other

(Holweg and Pil, 2008). RBV is used in the second article to investigate the relationship between supply capabilities and performance in more than 3,500 firms worldwide. The researchers find that demand-oriented capabilities are likely to confer greater competitive advantages than cost and supply-oriented capabilities, although both are important (Morash and Lynch, 2002). RBV continues to be influential in the study of supply management theory and practice (McIvor, 2009).

Strategy Structure Performance

The antecedents of the SSP theory originate in propositions concerning the impact of a firm's strategy on organisational structure and the maxim 'structure follows strategy' (Chandler, 1962). This work was extended in a number of large surveys to understand the relationship between strategies of diversification and structures of divisionalisation (Mintzberg et al., 1998). The best known is research that discovered that although 70 percent of Fortune 500 companies were in a single business in 1949, over half of these had diversified by 1969. Most of these companies matched their diversification strategy with a new organisational structure, as Chandler predicted, but the research notably also proposed that some strategy-structure combinations result in superior financial performance for the firm than other combinations (Rumelt, 1974). The proposed strategy-structure-performance link (SSP) was substantiated by later research (Armour and Teece, 1978, Hoskisson, 1987) and alignment between strategy and structure became a generally accepted requirement to achieve good organisational performance (Egelhoff, 1988, Miles and Snow, 1984).

In the literature, SSP is used to develop a framework for possible use in the research of the structural properties of logistics organisations (Chow et al., 1995) and as the basis of a proposition that the logistics function is well positioned to assume a unique role in the firm, bridging strategy and structure in manufacturing environments (Stock et al., 1998). The SSP paradigm is also used to develop a framework proposed as a first step towards a holistic, theory based understanding of the link between information integration and supply chain performance (Speier et al., 2008). Considering the application of the SSP paradigm to supply strategy, it has been noted that SSP places an emphasis on the importance of goal alignment and shared belief in the supply chain (Defee and Stank, 2005). SSP asserts that to achieve strong performance the strategies of many, if not all, of the firms along a supply chain must be consistent. Likewise, it requires that there is a shared belief in the competitive potential of the supply chain, as shared belief enhances performance (Ellram, 1995). A noteworthy common starting point for these papers is, consequently, some consideration of the context in which SCM is embedded – e.g. technical, logistical, international, etc..

The limitation of 'imported' theory

While RBV, TCE and SSP are frequently imported into the broader supply management literature, their focus also constrains their application at the intersection of supply and strategy. The three theories each operate successfully when analysing supply at the level of the firm (Defee and Stank, 2005, McAfee et al., 2002). However, the operational unit of analysis for this study is the *actors* within the firm / network engaged in creating supply strategy and not *the firm* itself. In this capacity RBV, TCE and SSP have limited application in helping to grasp the individual processes and transactions that create supply strategy within firms and across organisational boundaries.

Significantly, the IMP Group's research perspective does facilitate an appropriate level of analysis, since the actor's role in continuing business relationships is often the unit of analysis in IMP research (Gadde and Hakansson, 2001). Examples of research of this type include the management capabilities required in network environments (Moller and Halinen, 1999), the nature of buyer-seller relationships (Turnbull et al., 1996) and the notion of non-static power-dependence between vendors and purchasers in an industrial market (Hakansson and Ostberg, 1975). The IMP Group also focuses on broader units of analysis such as interfaces in networks (Hakansson and Ford, 2002, Hakansson and Snehota, 2006). The IMP research will, consequently, feature in the next section that looks at contributions to and from fieldwork in the 'content' literature.

Contributions to/from fieldwork

Beginning with studies that sit within the 'purchasing' perspective of supply management, several articles focus on the application of electronic commerce (e-business) to supply. These reflect a period in the late 1990's / early 2000's when e-business was very in vogue, although adoption of e-business in supply chains was subsequently slower than expected, particularly in small to medium sized enterprises (Harland et al., 2007). The proposition in favour of e-business is that its greater information processing capability facilitates a more strategic approach to supply management and enables firms to take advantage of cost reductions and strategic leverage, typically in low-value, high-variety goods and services (Croom, 2000, Rai, 2000, Peleg et al., 2002). However, while advances in e-business have made it possible for companies to adopt innovative supply strategies, empirical research has also shown that a company's failure to understand the value of information and/or the necessity to co-ordinate information flow within and across the business can obstruct these benefits (Sahin and Robinson, 2002). A study conducted into the extent of e-business adoption in the UK and Ireland found that despite its potential, small and medium size enterprises (SME) especially were not realising the full benefits. In such firms, the

technology was more often used to merely gather information and communicate with suppliers (Wagner et al., 2003).

Nonetheless, e-business is perceived to be a potential catalyst for the development of procurement, customer relationship management and the fulfilment process, although it is argued that the application of e-business within the firm should evolve through cumulative development to include supply via sales, customer account management and operations (Croom, 2005). Other empirical studies have traced the development of e-business within the firm (Sammon and Hanley, 2007) and demonstrated a positive co-relationship between supply strategy, business strategy and the adoption of e-business (Hafeez et al., 2006). Examples of other 'purchasing' topics addressed by empirical study are set out in Appendix 2.

Two topics are especially notable in the empirical studies that sit within the 'operations' perspective of supply. The first is a focus on the application of lean thinking (Womack and Jones, 1996) and agile manufacturing (Nagel and Dove, 1991) to supply. In a case study of a computer manufacturer's supply chain, it is suggested that it is too simplistic to apply the two paradigms in isolation or as a progression. Agility means applying market knowledge and a reactive supply network to take advantage of opportunities in a volatile market. Lean is concerned with eliminating waste in the value stream with the aim of creating a level schedule. From a supply perspective, the authors assert that companies should aim for 'leagility' – a combination of both paradigms (Naylor et al., 1999). The view that leagility is applicable within a supply context is supported by others (van Hoek, 2000, Naim and Barlow, 2003). One article reports that the dichotomy between a lean or an agile approach to supply management is particularly less useful in complex, one-off project environments, such as shipbuilding or construction (Sanderson and Cox, 2008) and further studies have conducted empirical investigations into supply strategies that are a combination of lean and agile (Cagliano et al., 2004, Goldsby et al., 2006).

The second notable topic in this literature is logistics / supply chain management, covering a range of specific issues. Research on the evolution of logistics organisations and structures (Bowersox and Daugherty, 1987) and the identification of logistics strategies used in North America (Closs and Clinton, 1997), based upon earlier research that looked at the way that firms align logistical resources to achieve business objectives (Bowersox and Daugherty, 1995), were both previously referred to. For information, further 'logistics' articles are summarised in Appendix 3. In addition, the literature includes articles on inter-organisational learning and knowledge transfer as a means for creating competitive advantage within

supply chains (Dyer and Nobeoka, 2000, Giannakis, 2008), co-ordinated action in reverse distribution systems (Flygansvaer et al., 2008), assemble to order strategy (Sochocki Jr and Kaminski, 1999), an empirical study providing evidence linking supply chain strategy and company risk structure (Papadakis, 2003) and an investigation focussing on the strategic trade-offs between product customization and cost minimization (Waller et al., 2000). A study also identifies three difficulties in forming supply strategy, citing partner capabilities, communication & inadequate performance monitoring (Hauguel and Jackson, 2001). Nonetheless, the article fails to step beyond identifying the difficulties to consider how supply strategy is or should be formed, except to urge firms to realise that the future of supply chains is not within the firm but outside of it.

With regard to the 'relationship' perspective of supply, IMP Group research contributes a number of empirically based, relationship-focussed articles to the literature. The earliest of these considers the underlying concepts and features of the Group's first study of European industrial marketing and purchasing, focussing on the relationship between buying and selling companies in France, Germany, Italy, Sweden and the UK (Cunningham, 1980). The outcome of this influential study includes the conceptualisation of the IMP Interaction Model (Hakansson, 1982), in which four variables are identified that describe and influence the interaction between buyers and sellers. They are the interaction process itself, the participants in the interaction, the environment in which the interaction takes place and the atmosphere that both affects and is affected by the interaction. The Interaction Model was subsequently used by others as a framework for examining buyer / seller relationships; for example, in an empirical test to demonstrate that the exchange of information and contacts between buyers and sellers produces a co-operative atmosphere and leads to mutual adaptation between the parties (Metcalf et al., 1992). A more recent example uses the Interaction Model to examine the stability of relationship building constructs at different levels of a traditional distribution channel (Kalafatis, 2002). Latterly, the propositions made by the original IMP study have been re-evaluated to take into account changes in the business environment since 1982. The conclusion reached is that while the original study's ideas on the structure of the business have been recognised to some extent, its challenge to the idea of independent company action has not been so generally accepted (Ford and Hakansson, 2006).

Other fieldwork contributions in the IMP tradition include the economic consequences following from different degrees of involvement with suppliers (Gadde and Snehota, 2000), the examination of the impact of time, market orientation, culture, communication, and trust on relationships in manufacturing and service industries (Batt and Purchase, 2004), five case

studies examining how the logistics activities of a company are dependent on activities performed by surrounding companies (Hakansson and Persson, 2004) and an analysis of distribution networks which reports that power and conflict are as important in contemporary distribution networks as in traditional channels, although they may be exploited in different ways (Gadde, 2004). Additional articles survey the history and aims of the IMP Group (Ford, 2004) and question the practical relevance of empirical contributions from IMP research to the needs of managers and practitioners (Brennan and Turnbull, 2002). Nonetheless, while IMP research often takes the actor's role in continuing business relationships as its unit of analysis and unlike RBV, TCE and SSP is not so centred on firm level analysis, it should be noted that these fieldwork contributions illustrate that IMP Group research is still predominantly focussed on describing what supply strategy is rather than how it comes about.

Other scholars have also directed empirical research towards supply relationships and strategy. A noted article is a case study of Chrysler, which documents how a new supplier relationship strategy played its part in the car manufacturer's revival during the 1990's (Dyer, 1996). Chrysler's approach included choosing suppliers early in a new vehicle's concept development phase and having their own and their suppliers' engineers work side-by-side to develop components. The Chrysler case and most other empirical studies take the supplier-customer dyadic as a point of departure in the empirical examination of supply relationships (Anderson et al., 1994), although some academics have argued for more attention to be given to relationships from a supplier network point of view (Gadde and Mattsson, 1987, Hauguel and Jackson, 2001).

Authors have also addressed the issue of managing supply relationships. Free information exchange is asserted as necessary to ensure relationship stability where customer-supplier relationships are observed to be mutually dependant (Paliwoda and Bonaccorsi, 1994) and based on empirical data collected in the US and UK, the findings of another study indicate that the main reason companies enter long-term relationships is to achieve an instant cost advantage (Cousins and Spekman, 2003b). The authors note, however, that the full benefits of collaboration are only realised when knowledge is shared and developed among many supply partners, thereby giving the entire supply chain a competitive advantage. A study of the factors that influence suppliers to choose buyer-focused operations as a supply strategy in their relationships with key buyers, conversely cautions that driving for close cooperation in a supply relationship needs to be carefully considered as it is contingent on business characteristics (van der Vaart and van Donk, 2006).

Competitive advantage and performance

Cutting across all three perspectives of supply management, competitive advantage and performance are prominently addressed in the empirical literature. For instance, a global investigation of supplier and customer integration strategies is highly cited (Frohlich and Westbrook, 2001). This offers empirical evidence that greater integration with suppliers and customers has a strong association with improved firm performance. However, the association between supply strategy and firm performance is still hotly debated in the literature. Building on Frohlich and Westbrook (2001) others assert that increased supply-side integration alone can lead to improved business performance (Rosenzweig et al., 2003) or conversely, that the relationship between supply chain integration and firm performance is at best indirect (Vickery et al., 2003). Further studies have been equally at odds, variously asserting that coordinated use of supply and diversification strategies positively affects firm performance (Narasimhan and Soo Wook, 2002), that internal integration is the most important contributor to cost-containment, while integration with the supplier is the best strategy to achieve reliable supply performance (Chang Won et al., 2007) or that while logistics performance is positively impacted by supply strategy, neither supply strategy nor logistics performance directly impact a firm's financial performance (Green et al., 2008). While the literature is inconclusive on the subject of an empirical link between supply strategy and firm performance, several articles propose performance measures for supply strategy. For instance:

- Very tailored measures, such as a performance matrix intended to indicate the importance and effectiveness of service provided to beverage retailers (Bommer et al., 2001)
- Preliminary measures for use in business-to-business (B2B) commerce (Rosenzweig and Roth, 2007, Dawei and Jiju, 2003),
- The proposed use of comprehensive benchmarking to assess the effectiveness of a company's procurement function (Thompson, 1996)
- More generically, a representation of best practice in supply management performance measures developed during an investigation of more than 3500 firms in North America, Europe and the Pacific Basin (Morash and Lynch, 2002).

Meanwhile, empirical studies have explored supply performance under varying conditions of information exchange and demand uncertainty (Closs et al., 1998), the effect of logistics capabilities on firm performance (Lynch et al., 2000, Rubesch and Banomyong, 2005), evidence linking supply strategy to dimensions of procurement performance (Janda and Seshadri, 2001), the relationship between demand-side and supply-side capabilities and

performance (Morash, 2001) and risk and supply performance (Papadakis, 2006a). Authors have also reported on the role of supply chain strategy and performance management in achieving competitive advantage (Harrison and New, 2002) and have cited the relative fit between supply strategy, supply practice and the strategy of the firm as being key to achieving superior financial performance (Baier et al., 2008). However, while the relationship between supply and corporate strategy has been variously investigated (McGinnis and Kohn, 1993, Monczka and Trent, 1991, Stuart, 1997, Du, 2007, Quintens et al., 2006) one study, which analyses the relationship between corporate and supply strategy in the paper industry, indicates that while firms may create separate supply and corporate strategies, it may be harder to find evidence in many sectors of supply strategy being consistently included as a mainstream component of corporate strategy (Koskinen, 2009).

Consideration of context

Two articles particularly emphasise that the link between supply strategy and performance is context dependant. The first asserts that different production strategies require different supply strategies (Sen et al., 2004). The second demonstrates that an effective supply strategy in one sector may not be appropriate in another sector (Sengupta et al., 2006). These articles are especially notable because, in the main, the supply strategy literature tends to be a-contextual. While the literature contains many fieldwork articles that describe supply management practice and strategy in a particular geography or industrial context, for example, the Scottish fishing industry (Wagner and Alderdice, 2006) or food retailing in the USA (Hoffman and Mehra, 2000) - see Appendix 4 for a list - explorations of the corresponding effect of contextual factors on supply strategy are generally under-represented in the literature.

The development of a guiding research question

This review has, so far, illustrated the breadth of the supply strategy 'content' literature. Consideration of the subject categories identified by three reviews of the supply chain literature further substantiates this observation (Carter and Ellram, 2003, Croom et al., 2000, Rungtusanatham et al., 2003). Comparing and combining the topics classified in each of these reviews enables a theoretical representation of the overall scope of the supply literature to be formed (Figure 3 - overleaf).

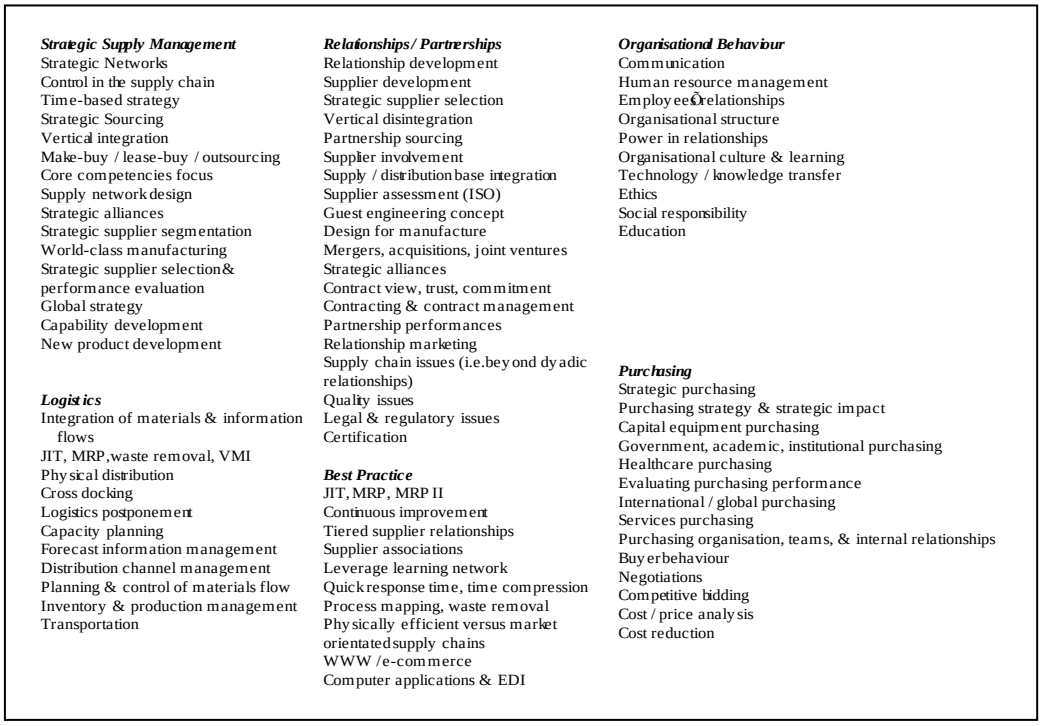

Figure 3. The theoretical scope of the supply strategy content literature

Given the evident breadth of the topics demonstrated in the literature, consideration needs to be given to whether practitioners address a correspondingly wide scope of content when formulating and implementing supply strategy. Based on the span of topics illustrated above and the prima facie observation of practitioners, the proposition of this study is that 'in practice' supply strategy does not address the wide scope of strategy 'content' suggested by the literature.

To explore the possibility that the 'content' literature has, therefore, gone beyond empirical practice, the following research question will be used to guide the subsequent investigation:

RQ 1. What is supply strategy content 'in practice'?

- *What is the scope of supply strategy content?*
- *What is the nature of the interaction between supply strategy content and context?*[6]

[6] In this context, the term 'interaction' is used to refer to the possible effect of context on the scope of strategy content and/or the relative appropriateness of particular supply strategy content to some contexts before others.

Given that the literature is generally a-contextual, it should be noted that the guiding research question also seeks to explore any observable interaction between supply strategy context and content. This review will now proceed to an evaluation of the supply strategy 'process' literature.

2.4 Supply Strategy Process

This second section of the literature review consists of 51 articles, i.e. 22.3 percent of the total 229 articles supply strategy articles located. 22 are empirical articles and 29 are normative articles. All are concerned with the manner in which supply strategy comes about, i.e. *the how, who or when of supply strategy process*.

Definition

The firm is still the dominant construct for conducting and organising economic activity and supply management is predominantly viewed as an operating function whose purpose is to enhance the firm's competitive position and advantage (Lockamy III, 2004). In supply, the predominant position is that each firm independently formulates its own supply strategy after corporate and business unit strategies have been finalised (Lummus et al., 1998) – see figure below. These form the constraints on which the supply strategy is developed and focuses supply strategy toward how best to contribute to the firm's broader strategic objectives.

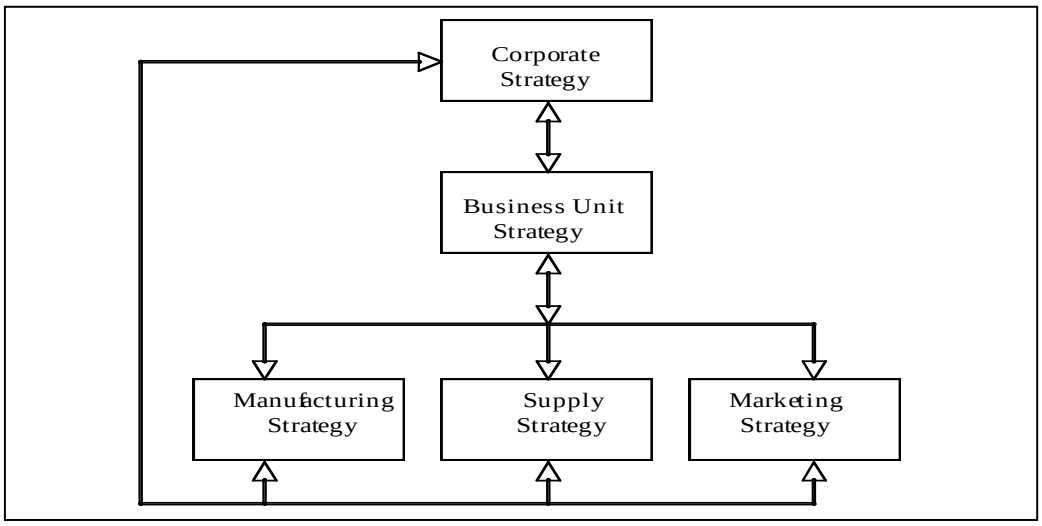

Figure 4. Formulation of a simplified supply strategy (adapted from Lummus et al. 1998)

Supply strategy is largely presented in this way in the literature (Anderson and Katz, 1998, Lummus et al., 1998, Monczka and Morgan, 2000, Narasimhan and Carter, 1998), i.e. as a hierarchical extension of corporate strategy. This is recognisable as a continuation of the conceptual models intended to help purchasing develop a strategic role within the firm (Reck & Long, 1988; Freeman & Cavinato, 1990; Watts et al, 1992).

Theoretical development

Incorporating theory from other fields (e.g. TCE and RBV) the make-buy decision has become central to the definition of supply (Platts et al., 2002), i.e. it defines those products,

processes or services that are to be sourced internally or obtained from external sources and therefore, instigates the supply strategy. The make-buy literature consequently makes a significant theoretical contribution to the broader question of how supply strategy comes about. Make-buy is a core theme in manufacturing strategy (Hayes et al., 1988, Platts and Gregory, 1989) but the outcome of the make-buy decision has consequences across the firm, for example for manufacturing capacity planning, supply management, human resource planning, facility design, capital investment and new product development. Although an important issue for decades, the strategic significance of the make-buy decision has grown with the reduction of vertical integration. During the 1980's competition for the acquisition of resources, markets and talent became global (Cousins and Spekman, 2003b) and intense rivalry required companies to benchmark against the best in the world. However, few organisations could afford to sustain the infrastructure necessary to support operations on a global scale. Consequently, companies began to consider strategic alliances with other firms whose interests were complimentary (Ouchi, 1981) and the outsourcing of activities not considered strategically advantageous or core to the organisation (Hamel and Prahalad, 1989, Prahalad and Hamel, 1990).

This move towards outsourcing resulted in firms becoming increasingly dependent on their supply base and in turn, for the make-buy decision to assume increased strategic importance (McIvor et al., 1997b). Two main streams of literature have been identified (Canez et al., 2000). The first addresses the make-buy question from a cost viewpoint (Balakrishnan, 1994, Ellis, 1992, Ellis, 1993, Raunick and Fisher, 1972). The conceptual basis of this perspective is TCE; the combination of economic analysis and management theory used to determine the internal and external boundaries of the firm. However, although transaction cost analysis is generally applied at the level of the firm (Defee and Stank, 2005, McAfee et al., 2002), the make-buy literature's unit of analysis is the operational process of determining whether an item should be manufactured in-house or purchased from a third party. The second literature stream acknowledges additional factors in the make-buy decision other than cost, for example the business environment, core and peripheral activities, technology and supplier relationships (Jennings, 1997, Quinn and Hilmer, 1994) and different approaches to make-buy from cost, business and policy perspectives (Ford et al., 1993).

Various authors have proposed models for developing make-buy strategy and the criteria to be considered (McIvor, 2008). For example, two address the make-buy decision from a technological perspective. The first is a three by nine conceptual strategic sourcing matrix that takes into account the maturity of process technology across industries, the significance of process technologies and the position of process technology relative to competitors

(Welch and Ranganathan Nayak, 1992). The second proposes a three by three competitive/importance matrix and four phases of analysis for developing make-buy strategy. The phases are initial business appraisal, internal/external analysis, generating/evaluating options and choosing the optimal make-buy strategy (Probert, 1997). The strategies suggested by both matrices would require further investigation and the inclusion of additional considerations in use with a specific make-buy decision (Canez et al., 2000). In general, however, the actual steps involved in the decision-making process of make-buy are less well represented in the literature. Previous research has – to a limited extent - been more concerned with identifying the functions that should engage in the make-buy process, rather than with the process of their engagement (Moses and Ahlstrom, 2009).

Three articles examine the make-buy decision from a RBV perspective. The first focuses on existing internal resources and aims to link product differentiation, component family analysis and manufacturing capability as a means of deciding make-buy questions (Venkatesan, 1992). The basis of the approach is a focus on components that are both critical to the manufactured product and in which the firm has a core capability. The article recommends outsourcing components where suppliers have a distinct competitive advantage and using outsourcing as a means of improving in-house manufacturing performance. However, the article does not present in any detail the means by which this should be done (McIvor and Humphreys, 2000). The second article also focuses on internal resources, although more generically, developing a conceptual framework for evaluating make-buy decisions based on core competencies, internal versus external capabilities and internal versus external cost (McIvor et al., 1997a). The third approach also focuses on the identification of critical resources, however, the perspective is extended to include those resources within the supply chain that are of critical importance to the firm, rather than only those within the firm (Cox, 1997). The suggested methodology for identifying critical assets is to create a typology of the supply chain and a typology of the resources within the supply chain. While the article does address issues such as ownership, control, skills and technological resources, all of which relate to the make-buy decision, the overall approach is more appropriate for developing corporate make-buy strategy than addressing specific make-buy decisions (Canez et al., 2000). Nonetheless, these make-buy frameworks are illustrative of theoretical contributions to the supply strategy literature and provide insight into one aspect of the broader question of supply strategy process.

Normative frameworks

The ‘process’ literature also contains a large number of theoretical frameworks, tools and methods for formulating or choosing other aspects of supply strategy. Some of these are

tools designed to help the practitioner select a strategy, others are proposed approaches for creating strategy. Although the distinction between the two may not be immediately recognised and a specific paper may fall somewhere on a continuum between these two points, the significance of the distinction is the perceived role of the actor in creating supply strategy. For example, three studies deal with the problem of vendor selection. One study developed a mixed integer linear software program to propose an optimal solution to a problem in which a buyer must obtain various stock items from a variety of vendors who charge different prices, have limited capacities and different levels of quality but offer bundled products at discounted prices (Rosenthal et al., 1995). A follow-up article suggests a reformulated solution to this problem that proposes a more cost-effective purchasing strategy, reduces the computational workload and permits the buyer to purchase more than one bundle per vendor (Sarkis and Semple, 1999). A third study takes a different approach, presenting a vendor selection model that takes into account product type, supplier type and the OEM/supplier integration level in the decision process (Huang and Keskar, 2007). In these three instances, however, the model/algorithm constrains the actor's role to the selection or rejection of the solution put forward. Other examples relating to the selection of procurement strategy include mathematical models that determine the optimal order quantity to purchase via forward contracts and spot markets, to be used by practitioners to determine the optimal procurement strategy (Seifert et al., 2004), an activity-based costing approach to the same question (Degraeve and Roodhooft, 2000) and a model which selects suitable supply strategy based on customer sensitivity and risk alleviation competency dimensions (Faisal et al., 2006). Further examples of frameworks are set out in Appendix 5.

The role of actors and context in supply strategy process

The role of actors in supply strategy process appears to be largely overlooked in the literature, in favour of an emphasis on the selection of strategy derived from programs/matrices, although the actor's role in developing supply strategy has long been acknowledged (Farmer, 1978, Finkin, 1988). One study addresses the context and content of generic supply strategy and discusses the strategy-making process, presenting a practical conceptual framework for supply strategy formulation (Nollet et al., 2005b). The resulting decision framework is hierarchical and postulated on the assumption that supply strategy is derived from corporate/business strategy as previously described, with a top-down cascade of corporate/business objectives to the functional level within the firm (supply, operations and marketing), integration and consolidation of functional strategy across these functions and finally implementation. Nonetheless, the study notably identifies actors ('supply managers') as playing an active role in formulating and realising the potential of supply strategy to fulfil the strategic objectives of the firm, rather than being responsible for

implementing a strategy derived from an analytical model/program. An additional reading of the assumptions underpinning this approach could be that strategy formulation is not a one-off event but an on-going process of adjustment better suited to participating actors than an analytical model, although the paper does not explicitly represent the decision framework as on-going and iterative.

With regard to the context in which supply strategy process is embedded, few studies appear to address contextual issues directly. One that does explores the characteristics of emergent supply strategy and proposes a range of supply strategy positions from efficient to emergent, based on the market structure, supply stability and demand uncertainty (Sebastiao and Golicic, 2008). Considering the practical implications, the authors make the point that a supply chain will influence *and* be influenced by the unfolding supply and demand characteristics of the marketplace. Other authors put forward the theoretical tools and techniques needed to avoid ineffective mismatches between supply strategy and product characteristics (Childerhouse and Towill, 2000), assert ways to build resilient supply chains that can identify and manage contextual risk (Christopher and Peck, 2004) and propose the use of artificial intelligence techniques in a knowledge-based simulation platform to accumulate the successful experience of enterprises in formulating and implementing supply strategies (Chan et al., 2006).

The implications of developing supply strategy from an industrial network versus a strategic management perspective are also addressed (Gadde et al., 2003). The paper notes that from an industrial network perspective the firm should analyse its situation in terms of its relationships and connections, relating its activities to other firms in order to enhance performance. From a strategic management perspective, however, there is an on-going debate about whether resources or activity systems have the most to offer in performance terms. The paper concludes that in formulating strategy, resources, activities and actors need to be considered together.

The contribution of fieldwork

The literature search identified 22 contributions from fieldwork that address supply strategy process. However, it has been noted in business strategy process research, that most theoretical and empirical studies actually focus on discrete decisions rather than on ‘strategy’. For instance, there is a focus on a major investment decision that appears to be strategically significant, rather than on how ‘strategy’ is formed (Chakravarthy and White, 2002).

A discrete decision focus was found in half of the 22 articles identified by this literature search. To illustrate, two articles address build-to-order manufacturing strategy and supply management in the automotive industry. In the first, a US based study builds on examples from the IT sector (e.g. Dell Computers) to present empirical research on modularity, as part of a mass-customisation strategy to achieve build-to-order operations and an efficient supply strategy (Ro et al., 2007). The paper notes that the automakers failed to take full advantage of the potential of modularity activities, seeing them as cost driven and overlooking their potential for mass-customisation. Likewise, modularity was not accompanied by the changes in the infrastructure necessary to facilitate long-term supply relationships. The second study is of a European automaker that developed a supply strategy based on build-to-order production but whose supply strategy needed to be re-formulated as the company grew sales globally (Miemczyk and Howard, 2008). Based on observations taken at a two-day workshop held at the company's headquarters, the study notes that the actors were constrained in their actions due to the multi-level aspect of strategy (i.e. corporate and functional strategies) and by the extent to which the actors could exert control beyond the boundary of the firm.

In both examples, the topic studied is build-to-order strategy but each brings to the fore a different discrete decision for study, rather than consideration of strategy process. In the first case, it is the need for the firm or supply network infrastructure to enable supplier relationships and in the second, the opportunity that actors have to act strategically. Both issues are significant. However, the problem is that discrete decisions are only a single step in a longer sequence of steps that form strategy. The study of discrete decisions in isolation, consequently, does not capture the complexity / patterns of decisions and actions that culminate, over time, in strategy.

Accordingly, the 11 articles are set aside as being too narrowly focused on discrete issues rather than strategy process. Two further articles are also set aside; the first because its scope is limited to the empirical validation of a process model (Schnetzler et al., 2007) and the second, because it focuses on the formulation of 'downstream' focal company to consumer supply strategy rather than 'upstream' focal company to supply base strategy (Hilletofth, 2009). Agency theory suggests that the contract between principal and agent is fundamentally different when viewed from a downstream perspective (Eisenhardt, 1989a). Details of these 13 articles are included, for reference, as Appendix 6 and the rest of this section is, consequently, directed to consideration of the remaining nine articles that focus on the patterns of decisions and actions culminating in supply strategy.

The empirical supply strategy process literature

The view that resources, activities and actors are key factors in the formation of supply strategy (Gadde et al., 2003) and that there is a dynamic interchange between the organisation and its environment (Child, 1972) guided the review of these nine empirical supply strategy articles. Each was assessed on the basis of the degree to which it addressed the question of who is involved in the process of supply strategy formulation / implementation, the actor's role in the organisation or supply network, their actions, processes and limitations, the extent of the tangible / intangible strategic resources that the actors can influence and the context in which actors carry out these activities.

Of the nine articles, only two explicitly identify the actors involved in supply strategy process but even so, these are only broadly referred to as 'management' actors. The first paper uses an action research based process - Strategic Operations and Logistics Planning - to develop an integrated supply strategy (Sadler and Sohal, 2005). This paper presents an empirical validation of the model as a tool for strategic analysis; however, it does not explore empirically the subsequent steps of strategy process that culminate in supply strategy. The second paper also does not describe the entire supply strategy formulation process. Instead, it develops a five-dimensional model of major supply initiatives to consider how the characteristics of supply managers shape strategic directions that firms pursue in supply (Johnson et al., 2007b). As a result, the paper's main contribution is an improved understanding of the drivers of planned supply initiatives and specifically, that senior management expertise has more influence than industry sector in determining the selection of planned initiatives. This serves to highlight the importance of actors in the strategy formulation process.

While they do not identify specific individuals or groups, the engagement of actors in supply strategy is, nonetheless, also highlighted in three further studies:

- The first asserts that research on industrial purchasing has neglected the strategic aspects of buying in favour of more operational and structured buying processes (DeRijcke et al., 1985). The article applies a model for unstructured decision-making to analyse five cases of strategic processes in the purchasing of production materials. Notably, this paper draws attention to the involvement of actors who are within the firm but outside of the purchasing function in strategic decisions and the corresponding restriction of purchasing function's role to that of a 'gatekeeper' in these situations. The paper does not go further to explore the

relative roles of management and individual contributors within these decisions, however.

- The second paper describes an improvement / change process informed by new insights from non-linear dynamics, complexity and chaos theory. It describes the application of the process to two cases in which the firms were transitioning to working co-operatively in the supply chain and specifically, the use of a four-phase model (Macbeth, 2002). Although this paper is relatively narrowly focused, it brings to the fore the role of actors within and outside of the firm in the formulation of supply strategy, highlighting that where firm strategy is generally constrained by the boundaries of the firm, actors more often create supply strategy across organisational boundaries.

- The attention of the third paper is relationship strategy as one element of supply strategy; in this case a dyadic relationship rather than the focal company's relationships within a supply network (Venugopal, 2004). Although limited in scope the paper does superficially address actors, their activities and context. These included mapping a process of quality certification, bi-weekly reviews and monthly cross-functional meetings, developing build-to-order processes and instigating face-to-face weekly meetings between supply partners and the focal company's operations function.

With regard to the actual activities and actions carried out by actors engaged in supply strategy process, besides the relatively superficial descriptions contained in the Venugopal (2004) paper, accounts of supply strategy process activity and practices are not addressed by these nine empirical papers. In common with Sadler and Sohal (2005), where empirical practice is addressed the focus is instead on the validation of a process model. For example:

- A case study is presented where 'Participative Business Modelling' was used to assist in the development of a European logistics strategy for an American pharmaceutical firm setting up operations in Europe (Akkermans, 1995). However, the empirical element of the paper does not go beyond presenting an explanation and critique of the application of a strategy process model.

- A study of the impact of product life cycle on supply chain strategy (Aitken et al., 2003) demonstrates how an innovative UK lighting company re-engineered its supply chain to accommodate the impact of product life cycles. The model

evaluated is a complex flow diagram showing six stages of the product life cycle (birth; infancy; maturity; maturity/saturation; saturation; decline). Nonetheless, the role of actors in the decision process is not explored and it does not address the implementation of the planned strategies or the effect that context, actors, resources and actions might have on realising non-intended outcomes.

- A model was developed to analyse supply chains with the intent of reducing the uncertainty in supply strategy process (Kotzab et al., 2003). The model, which combines e-business with SCM concepts and utilises TCE, RBV and network theory, was validated within the global supply chains of two agricultural chemical corporations. While the paper presents an empirical validation of the model as a tool for strategic analysis, it does not explore empirical supply strategy process activity.

The contextual setting of the papers

Two of the nine papers do not focus explicitly on their contextual setting (DeRijcke et al., 1985, Kotzab et al., 2003), while others assert the context in which the paper is embedded; for example, a European logistics strategy for a US pharmaceutical company (Akkermans, 1995), a UK lighting company (Aitken et al., 2003), the Australian meat processing sector (Sadler and Sohal, 2005) and large North-American firms (Johnson et al., 2007b). That context should be considered in the formulation of a supply relationship strategy is also highlighted by Venugopal (2004). Conversely, none of these papers explicitly explores the effect of context on supply strategy process.

There are two exceptions where the papers engage with the effects of context on supply strategy process. In the first, the authors conclude that there can be no alternative to emergent strategy in supply as variations in context mean that no prescription of a correct implementation path would be effective (Macbeth, 2002). The significance of this assertion is that it questions the degree of 'rationality' possible in supply strategy formulation and whether the motivations and emotions of actors can be disregarded in the study of supply strategy process.

The second paper concentrates on the effects of product-market characteristics on logistics strategy formulation, significantly noting that globalisation brings new challenges to logistics strategy; particularly that strategy content and strategy process are likely to differ by geographic region (Cooper, 1993). Citing industry examples, the paper proposes that several factors including value density, product price as a driver in the marketplace and the

commonality of branding, formulation and peripherals are all closely linked to the formulation of supply strategy. The paper also notes that factors upstream from production, such as the sourcing of raw materials, are necessary considerations in the formulation of global logistics strategy. Since globalisation was a developing phenomenon in the early 1990's the paper concludes by speculating on what organisational configurations will be necessary to implement global logistics strategy.

With the exception of these two papers, therefore, the empirical supply strategy process literature is predominantly a-contextual – in common with most of the 'content' literature – which is also often embedded in a particular sector and/or geography but rarely addresses the effects of context on supply strategy.

The development of a guiding research question for supply strategy process

The nine papers reviewed above were identified as likely to address who the actors are that engage in supply strategy process, their role in the organisation, what strategic activities and actions take place in supply strategy process, what strategic resources are influenced and how context affects supply strategy process. Three broad conclusions can be drawn as a result of the review.

1. The actors that engage in supply strategy process are not sufficiently identified by any of these studies, nor are their roles within the organisation. For instance, are the actors engaged in supply strategy process typically senior management, or lower level actors? Likewise, are these actors from the purchasing / supply function, from other functions within the firm, or even external to the focal organisation?

2. Apart from a superficial consideration by one paper, the literature does not make explicit the empirical actions and activities of actors engaged in supply strategy process. Consequently, the details of the transactions and practices of supply strategy process – and the resources influenced - remain unclear.

3. The supply strategy process literature is predominantly a-contextual in respect of the effect of context on supply strategy process. Consequently, the interaction between supply strategy process and context factors has not been sufficiently explored.

	Who are the actors?	What is their role in supply strategy process?	What activities / actions are carried out?	What strategic resources do they influence?	What is the context in which this takes place?
De Rijcke et al., 1985		*Purchasing's gatekeeper role in strategic supply decisions*[7]			*No explicit context*
Cooper, 1993				*Consideration of drivers in global logistics strategy*	*Supply strategy content and process differ by geographic region*
Akkermans, 1995			*Paper limited to the empirical validation of a process model*		*European logistics strategy / US pharmaceutical firm*
MacBeth, 2002		*The paper highlights actors' involvement in supply strategy process*			*Asserts the emergent nature of supply strategy*
Aitken et al., 2003			*Paper limited to the empirical validation of a process model*		*UK lighting company / product lifecycle*
Kotzab et al., 2003			*Paper limited to the empirical validation of a process model*		*No explicit context*
Venugopal, 2004		*Superficial consideration within the formulation of relationship supply strategy*	*Superficial consideration within the formulation of relationship supply strategy*		*Superficial consideration within the formulation of relationship supply strategy*
Sadler & Sohal, 2005	*Refers broadly to 'management' actors*		*Paper limited to the empirical validation of a process model*		*Australian meat-processing companies*
Johnson et al., 2007 (b)	*Refers broadly to 'management' actors*	*Highlights the importance of key actor characteristics as a key variable in supply strategy research*			*Large North American firms*

Table 3. Gaps and limitations in the empirical supply strategy process literature

The table above accordingly tabulates the contribution of each of the nine articles and illustrates the limitations and gaps in the literature. The proposition of this literature review is, consequently, that there is a gap in the empirical literature, where previous studies have failed to explore and make explicit the actions and activities of supply strategy process and

[7] In this thesis, 'strategic supply decisions' are those that contribute to achieving a competitive advantage for the organisation. For example, by securing rights to rare technologies or commodities, exploiting opportunities in low cost economies, formulating the make-buy decision, value engineering, exploring development and alliance opportunities along the supply chain, etc.

the actors that engage in it. This proposition, accordingly, suggests the following second research question to guide the subsequent investigation:

RQ 2. What is supply strategy process 'in practice'?

The lack of specificity in this processual research question reflects the limitations of the extant research. Therefore, it was necessary to consider what conceptual resources could be imported from other fields. Adjacent functional strategy domains were examined; especially operations strategy (OS) as the most closely related field to supply strategy - the call for an explicit recognition of the competitive potential of operating capabilities in corporate strategic planning (Skinner, 1969) for example, was subsequently mirrored in supply management (Farmer, 1972, Farmer and Taylor, 1975, Farmer, 1976). Regrettably however, not only has research in operations (and other functional) strategies lagged behind business/corporate strategy[8] (Akkermans and Von Aken, 1992) but OS process research remains a decidedly minority interest (Dangayach and Deshmukh, 2001). Indeed, even this limited body of work fails to offer a meaningful exploration of the context, organisational processes, roles of actors, etc. engaged in OS process. The blueprint for OS formulation (Skinner 1969) is a prescriptive 'top-down' planning model, asserting controlled analysis followed by implementation. Several authors have formulated normative ideals for OS process - typically based on a rational strategy process model (Hill 1985; Menda and Dilts 1997; Miller 1988; Mills et al. 1996; Platts and Gregory 1990). These commonly portray OS as being derived from higher-level business strategy. Reflection on OS formulation in any way other than through the plans and deliberate, rational intentions of management actors is extremely limited in this literature (Barnes 2002).

Strategy Process

As a result of these limitations in the 'functional strategy' space, it was necessary to turn to the business/corporate strategy field; where the notion of strategy process as a formal conceptual category initially emerged. Although mainstream strategy is typically concerned with profit maximisation[9] (Ansoff, 1965, Porter, 1985, Williamson, 1991), the strategy literature clearly recognises that an organisation's performance is influenced by both its strategy and the context - the internal (Hamel and Prahalad, 1994) and external (Pettigrew, 1992b) environment of the firm - in which the strategy is enacted.

[8] A literature review of empirical manufacturing studies (Minor et al., 1994) identified only eight empirical studies concerned with strategy process (Anderson et al., 1991, Cleveland et al., 1989, Fine and Hax, 1985, Marucheck et al., 1990, Schroeder et al., 1986, Swamidass, 1986, Swamidass and Newell, 1987, Tunalv, 1990).

[9] Other perspectives allow for pluralistic performance goals (Cyert and March, 1963, Mintzberg, 1987, Mintzberg and McHugh, 1985, Normann, 1977, Pettigrew, 1985, Quinn, 1980, Rhenman, 1973).

	Process	Associated Authors	Principle Ideas
Chaffee, 1985	Linear	Chandler, Andrews, Drucker	Formal action planning & resource allocation based on long-term goals
	Adaptive	Hofer, Miles & Snow, Mintzberg, Rumelt, Quinn	Development of a viable match between the firm's environment, resources & capabilities
	Interpretive	Pettigrew, Dirsmith & Covaleski	Orienting metaphors for guiding the attitudes of actors within the firm
Mintzberg, 1990	Design	Andrews, Chandler	Controlled analysis of internal resources, capabilities & the firm's environment
	Planning	Ansoff	As for Design School but with formal, mechanical planning processes
	Positioning	Porter	Analytical selection of generic strategies
	Entrepreneurial	CEO biographies, Collins & Moore, Baumol, Mintzberg	Vision & direction exists in the mind of an entrepreneurial leader
	Cognitive	Huff, Weick, March & Simon	Strategy is in the mind of the strategist. Strategy varies with the cognitive make up of the strategist
	Learning	Lindblom, Quinn, Mintzberg	Strategy is a process of learning over time. Sense is made of action retrospectively
	Political/Power	Allison	Strategy formation is a process of bargaining & negotiation
	Cultural	Rhenman	Strategy formation is the product of collective behaviour based on shared beliefs
	Environmental	Hannan & Freeman	Abstract environment forces strategy. Strategic management is a myth
	Configuration	Mintzberg, Miles & Snow	All of the other schools in their own time and context. Strategy as episodes
Whittington, 2001	Classical	Chandler, Ansoff, Porter	Deliberate calculation & analysis to maximise long-term advantage
	Evolutionary	Hannan & Freeman	Successful strategy emerges as natural selection delivers its judgement
	Processual	Mintzberg, Cyert & March, Lindblom, Quinn	Strategy emerges from a process of bodging, learning & compromise
	Systemic	Rhenman	The objectives & practices of strategy depend on the social system in which strategy making takes place
Chakravarthy & White, 2002	Rational	Simon	The conscious or unconscious selection of particular actions
	Political	Allison	Politics as deviation from techno-economic rationality
	Emergent/Evolution	Quinn	Strategy process as emergent and non-teleological
Baraldi et al, 2007	Planning	Ansoff	Strategy relates to the firm and its environment
	Positioning	Porter	Strategy creates unique positions based on activities differentiating from rivals
	RBV	Barney	Sustainable competitive advantage arises from unique resources
	Interaction/network	IMP	Strategy is constrained and enabled by external relationships
	Learn, Configure	Mintzberg	The actions called strategy both emerge and are planned
	Strategy-as-Practice	Whittington	Strategy is formed by the daily actions of strategists

Table 4. Summary comparison of perspectives on strategy process

The process of decisions and actions that culminate over time in strategy have been described from many perspectives and framed into numerous typologies. Table 4 (above) presents a summary comparison of five representative typologies spanning two decades (Chaffee, 1985, Chakravarthy and White, 2002, Mintzberg, 1990a, Whittington, 2001, Baraldi et al., 2007).[10]

The table illustrates that researchers have developed many distinct categories of strategy process and some typologies share common labels for principle ideas. For instance, Mintzberg (1990) and Baraldi et al (2007) utilise Planning & Position with similar definition, as do Mintzberg (1990) and Chakravarthy & White (2002) in their description of the Political perspective. Other labels are unique in this sample, for example Chaffee's (1985) use of the term Adaptive, Whittington's (2001) use of the term Processual and Mintzberg's (1990) use of Configuration.

At the heart of these apparently competing perspectives is uncertainty and divergence regarding the degree of 'rationality' in the decision-making process. A theoretically ultimately 'rational' process of decision-making would involve the decision-maker (actor) in the evaluation of all possible alternative courses of action, the generation and comprehensive consideration of the outcome for each alternative and the selection of the alternative most favourably suited to the required goal (Meyerson and Banfield, 1955). However, strategy problems are often unstructured and consequently actors cannot know or identify *all* possible solutions. Likewise, the consequences of alternative solutions are commonly indistinct and even if known, the actor is unlikely to be able to discriminate which is most favourably suited to the required goal. Rather than being free to act rationally, it is asserted that actors are boundedly-rational (Cyert and March, 1963). This means that actors engage in a restricted rather than comprehensive search for alternatives and rather than pursuing an optimal solution, actors seek to merely satisfy (Cyert and March, 1963, March and Simon, 1958).

An additional consideration in decision-making is that it is in the nature of organisations for disagreements and conflict to occur among actors concerning perceived alternatives and possible solutions – as counter-pointed by Allison in his book on the Cuban Missile Crisis (Allison, 1971). However, deviations from a 'rational' decision-making process that appear self-serving may be deemed politically motivated. Such behaviours can result in apparently disorderly decision-making processes that have been described as 'muddling through'

[10] Mintzberg (1990) subsequently formed the basis of a popular book on strategic management: (Mintzberg et al., 1998) The Political School of strategy process was renamed the Power School in the 1998 book.

(Lindblom, 1959). Strategy and the practices of strategy formulation are also seen as shaped by the social system in which they are embedded (Rhenman, 1973). Accordingly, strategic planning processes must be sensitive to variations in market, class, state and cultural systems. Nonetheless, empirical studies have shown that even allowing for bounded rationality, rational decision-making can result in superior decisions in certain contexts (Eisenhardt, 1989c, Eisenhardt and Zbaracki, 1992).

The 'classical' perspective of process

Early research on management strategy and structure assumed a 'rational' perspective on strategy process (Chandler, 1962, Learned et al., 1965). This and later work on corporate strategy (Ansoff, 1965) had a major influence on the practice of strategic management in the 1970's and spawned the corporate planning movement. Through adherence to any one of many step-by-step frameworks (Hofer and Schendel, 1978, Steiner, 1969) the corporate planning approach promoted a formal, 'mechanical' process for formulating strategy. This process was commonly carried out by dedicated groups of corporate planners. Quantitatively the corporate planning literature grew dramatically, but qualitatively it repeated the corporate planning mantra of controlled analysis and formal planning.

In the 1980's new ideas emphasising competitive analysis and generic strategies built on the widespread acceptance of rational analysis but capitalised on the growing disenchantment with the corporate planning movement. Porter's book *Competitive Strategy* and its successor *Competitive Advantage* (Porter, 1980, Porter, 1985) retained the structured, process based elements of its predecessors, but emphasised the importance of strategy and focused attention on the content of strategies. Most prominent among Porter's concepts are his model of competitive analysis, the notion of the value chain and his generic strategies.

While still addressing strategy decisions and actions as a top down process, Porter's ideas have subsequently been appraised as not adequately addressing the complexity of competitiveness (Hamel and Prahalad, 1994), as biased towards economic rather than social factors and generally only appropriate for large organisations operating in stable business environments (Mintzberg et al., 1998). The resource based view of the organisation 'RBV' (Barney, 1991, Wernerfelt, 1984) subsequently developed as an alternative perspective for thinking about the strategy of the firm at odds with Porter's then dominant conceptualisations, which argued that only a few strategies or positions in the marketplace are desirable in a given industry. These are those that can be defended against existing and future competition. In contrast, RBV asserts that it is possible to identify types of resources

that can lead to higher profits (rents) and, critically from a process perspective, reintroduces the notion that actors make strategic decisions, which was largely overlooked by Porter.

The 'emergent' perspective of strategy process

Contrasting the 'classical' view of strategy process is the conceptualisation that strategic decisions and actions come about through emergent processes as actors explore, learn and adapt strategy to an unfolding reality. From this perspective, deliberate strategies are differentiated from emergent strategies. Intended strategy may go unrealised or may proceed to form deliberate strategies that are realised as they were intended. Emergent strategies are realised despite or in the absence of intentions (Mintzberg and Waters, 1985). Realised strategy is therefore the culmination of intended and unintended actions and decisions unfolding in a process of learning over time. Where the 'classical' view of strategy process emphasises premeditated planning and implementation, the emergent view of strategy process perceives the reality of formulating strategic actions and decisions as a messy, fragmented and piecemeal process.

Within the emergent perspective there are, however, differences of perception among researchers. It has been asserted that strategic actions are not the direct result of strategic decisions at all. Actions result instead from the random application or coming together of actors, issues, ideas, solutions and decisions to a problem (Cohen et al., 1972). Others view strategy as being more in the mind of the strategist. Since actors bring peculiar biases and distortions to the decision-making process (Simon, 1947, Simon, 1957, March and Simon, 1958), strategies emerge from perspectives and frames of reference that actors use to address inputs from their environment (Mintzberg and Waters, 1990). In a corresponding view, actors are perceived to impose a cognitive structure to already enacted events (Weick, 1995), thereby discerning a pattern in a stream of past decisions/actions and explaining it as strategy (Mintzberg, 1978).

Others challenge the whole notion of strategy as a process of adaptation (Hannan and Freeman, 1977). According to this view, in a manner resembling biological processes and natural selection, environment forces strategy and the firm has limited strategic choice. The boundary of a firm's strategic autonomy is to decide the extent of resources to commit to maximising its fit with the environment as a specialist, and how many resources to keep in reserve as a generalist. As events play out the environment selects the firm with the best strategy. While this view condemns the formulation of strategy as 'a vain distraction', it has been noted that when Sony first introduced the Walkman to the American market, it launched more than 160 different Walkman versions with no more than twenty on the market

concurrently, thereby allowing the environment and not management actors to select the best way forward (Whittington, 2001).

Recognising the debate surrounding emergence, logical incrementalism was proposed as the normative ideal for strategy formulation (Quinn, 1978). Logical incrementalism accepts the restrictions of bounded reality but promotes instead, management's role in identifying the broad direction for the organisation. Rather than specify the strategy to achieve this, management's role is to move the organisation forward in an evolutionary way maintaining a strong core business, but sponsoring strategic side ventures that are encouraged to emerge from lower levels in the organisation. By staying environmentally alert, keeping strategic commitment to new ventures tentative at the early stages and by being reluctant to precisely specify objectives, management allows strategy to work through in action. Management's role in the creation of organisational vision and values has been advocated by others (Nonaka, 1988, Pascale, 1985, Weick, 1987, Chaffee, 1985, Mintzberg, 1987) as has the type/extent of involvement of non-management actors in the strategy formulation process (Burgelman, 1983, Mintzberg, 1990b, Imai, 1986).

Despite the apparent dichotomy of strategy into 'classical' and 'emergent' perspectives, strategy process can be seen to integrate both (Chakravarthy and White, 2002). Strategy process is frequently iterative and in reality, it may be very difficult to discern the true origins of a decision or action. Top down decisions may in fact have originated lower in the organisation. Rational analysis may be retrospective. Organisations are rarely stable and successive periods of stability and change describe the typical life cycle of organisations. Accordingly, strategic management is concerned with sustaining stability and then managing to minimise the disruption caused by change. Over time, the processes of strategy formulation deployed by organisations will embrace both the 'classical' and 'emergent' perspectives as context and situation vary (Mintzberg, 1990a).

Strategy as practice

In the evolution of academic understanding of strategy process, the 'strategy-as-practice' perspective can be viewed as complementary to and an extension of previous perspectives of strategy process (Baraldi et al., 2007). Focusing on strategy as a social practice, the strategy-as-practice perspective seeks to understand how practitioners of strategy really act and interact (Jarzabkowski, 2005, Johnson et al., 2007a, Whittington, 1996, Pettigrew, 1992b, Pettigrew, 1992a). Just as notions of emergent strategy challenge the rational perspective of top down strategy process, in the 'strategy-as-practice' perspective organisational level analysis is supplanted by a focus on the actors that make, shape and execute strategy, the

formal, diffuse or episodic activities of formulating and implementing strategy and the routines, procedures and cultures that shape strategy process (Whittington, 2006). Through the study of *practitioners* (i.e. those who make, shape and execute strategy), *praxis* (i.e. the activities of formulating and implementing strategy – whether emergent or planned) and *practices* (i.e. routines, procedures and cultures that shape strategy 'praxis'), the 'strategy as practice' perspective of strategy process assumes a connectedness between *praxis*, *practice* and *practitioners* but studies need not combine all three perspectives simultaneously[11]. Most notably, the 'strategy as practice' is more overtly concerned with identifying the actors engaged in strategy process than either the 'classical' or 'emergent' perspectives.

An integrative strategy process framework

To help unpack 'supply strategy process in practice' a conceptual framework was required. This was primarily because, as has been shown, the strategy process literature represents a wide spectrum of approaches that required a structure if they were to be engaged in the research. Secondly, a structure was necessary to bridge both the conceptualisations of strategy process *and* the role of actors.

A suitable framework was subsequently identified in the corporate strategy literature that contained the elements of what was required. This framework (below) is based on the varying roles that top managers and organisational members play in the strategy making process, which it contrasts to illustrate their interaction (Hart, 1992).

Descriptors	Command	Symbolic	Rational	Transactive	Generative
Style	*(Imperial)* Strategy driven by leader or small top team	*(Cultural)* Strategy driven by mission & a vision of the future	*(Analytical)* Strategy driven by formal structure & planning systems	*(Procedural)* Strategy driven by internal process & mutual adjustment	*(Organic)* Strategy driven by organisational actors' initiative
Role of Top Management	*(Commander)* Provide direction	*(Coach)* Motivate & inspire	*(Boss)* Evaluate & control	*(Facilitator)* Empower & enable	(*Sponsor*) Endorse & support
Role of Organisational Members	*(Soldier)* Obey orders	*(Player)* Respond to challenge	*(Subordinate)* Follow the system	*(Participant)* Learn & improve	*(Entrepreneur)* Experiment & take risks

Table 5. An integrative framework for strategy making processes (Hart, 1992)

[11] The term 'praxis' will be used throughout this thesis to denote the activities of formulating and implementing strategy.

Hart's Integrative Framework for Strategy-Making Processes (1992) has been widely cited in journals throughout the past decade. A brief search using the EBSCO Host database produced a list of 86 journal articles in which Hart's framework is cited, including – but not limited to - articles in prominent journals such as Long Range Planning (Brews and Purohit, 2007, Geurts et al., 2007, Lechner and Kreutzer, 2009), Journal of Operations Management (Anand et al., 2009, Papke-Shields et al., 2006), Organization Science (Atuahene-Gima and Ko, 2001, Mantere and Vaara, 2008, Rothaermel and Alexandre, 2009, Sanchez-Burks and Huy, 2009), International Journal of Operations and Production Management (Kiridena et al., 2009, Pun, 2004), Organisation Studies (Sillince and Mueller, 2007), Management Decision (Elbanna, 2008, Elbanna and Younies, 2008, Papadakis, 2006b, Parnell, 2005, Zeng et al., 2009), Strategic Management Journal (Branzei et al., 2004, Elbanna and Child, 2007) and Academy of Management Review (Sillince, 2005).

The model highlights five strategy making 'modes' - the *Command Mode* in which a strong leader or small leadership team design strategy and push it down into the organisation; the *Symbolic Mode* where leaders articulate a vision that guides the actions of organisational members toward goals; the *Rational Mode* where top managers determine strategic direction through formal planning processes that require structured organisational member involvement; the *Transactive Mode* where strategy emerges through transactions among organisational members, suppliers, customers and other stakeholders and finally; the *Generative Mode* where central direction gives way to internal entrepreneurship and in which top management adjust strategy to fit innovations that emerge from below. Hart speculated that the modes would not be mutually exclusive and an organisation might combine two or more process modes.

The framework was of interest for two reasons. First, it is constructed around the strategy process typologies in the literature (Ansoff, 1988, Bourgeois and Brodwin, 1984, Mintzberg, 1973, Mintzberg and Waters, 1985) and integrates the main concepts of emergent and rational strategy process. For instance, strong leadership defines the Command mode. Formal analysis and procedure defines the Rational mode. Both are aspects of the 'classical' perspective of strategy. The Symbolic mode reflects the idea that management's role is to provide vision and nurture strong corporate values (Quinn, 1980). The Transactive mode addresses the inability of actors to achieve more than bounded rationality (Cyert and March, 1963). Finally, high levels of independent action in the strategy making process are represented by the Generative mode (Bourgeois and Brodwin, 1984, Mintzberg and Waters, 1985). The second point of interest was that the framework represents multi-level analysis in

the organisation and emphasises the role of actors in the formulation and execution of strategy, while also allowing for the inner and outer contexts in the focal research organisations to be taken into account.

Consequently, the Integrative Framework was used to further refine the second research question. Specifically, the focus of RQ 2 was directed to four elements; the activity of supply strategy process (i.e. praxis & practice), the actors engaged in supply strategy process and the approach taken to supply strategy process (i.e. the strategy process typologies). Taken together, these three elements define the 'mode' of strategy making. Therefore, the fourth element considers the 'mode(s)' of supply strategy process that best 'describes' supply strategy process.

RQ 2. What is supply strategy process 'in practice'?

- *What activities are involved?*[12]
- *Who are the actors that engage in supply strategy process?*
- *How is supply strategy process approached?*[13]
- *Which mode(s) best describe supply strategy process?*[14]

2.5 A Synopsis of this Chapter and Research Questions

This literature review began (Section 2.1) by recognising that 'supply strategy' is located within the much broader terrain of 'supply management'. Section 2.2 subsequently described the three-stage review method used to identify the 'supply strategy' literature. The resulting review was divided into two groups; the first comprising articles that address *the content of supply strategy* and a lesser group – in terms of volume - concerned with *supply strategy process*.

Section 2.3 illustrated the extensive breadth of the supply strategy content literature but showed that despite its range, it is mainly a-contextual. The proposition that supply strategy practice may not generally extend across the range of content suggested by the literature subsequently instigated the development of the first guiding question for this research study:

[12] 'Activities' is used here as a descriptor for 'practices' used by an organisation, such as organisational specific routines, tools and cultures that shape strategising in supply and also those derived from larger social fields, for example use of the SWOT analysis technique.

[13] The 'approach' to supply strategy process refers to the 'praxis' or way in which supply strategy is formulated and implemented, for example via 'informal' episodes such as meetings or in sessions of 'formal' planning.

[14] The 'mode' of strategy making is defined by considering which mode(s) best describes the 'approach' actors take to strategising in supply and the 'practices' they use.

RQ 1. What is supply strategy content 'in practice'?

- *What is the scope of supply strategy content?*
- *What is the nature of the interaction between supply strategy content and context?*

Where the 'content literature' is extensive, Section 2.4 demonstrated the relative lack of supply strategy process literature, especially with regard to empirical studies. The proposition that supply strategy process is not as simply presented by the literature generated a second guiding research question:

RQ 2. What is supply strategy process 'in practice'?

To operationalise this question, consideration was given to what conceptual resources might be brought to the exploration of empirical supply strategy process from other fields. Having reviewed the corporate / business strategy literature, an integrative framework of strategy process was utilised that facilitated the integration of the main conceptual themes in strategy process with the identification of the role actors play in empirical strategy process. The *Integrative Framework* was subsequently used to further refine the second research question.

RQ 2. What is supply strategy process 'in practice'?

- *What activities are involved?*
- *Who are the actors that engage in supply strategy process?*
- *How is supply strategy process approached?*
- *Which mode(s) best describe supply strategy process?*

The following chapter – Chapter 3 - considers theoretical research paradigms and perspectives and presents the research methodology adopted for this investigation.

Chapter 3.

Research Philosophy & Methodology

Chapter 3. Research Philosophy and Methodology

This chapter explores research philosophy and explains the methodological options and choices made for this thesis. The theoretical paradigms and perspectives of research are explored first. Next, the theoretical standpoint of this research is located and its research strategy is identified. Issues of research reliability and validity are then addressed, followed by issues relating to the selection of cases. Finally, data collection and data analysis are explored.

3.1 Theoretical Paradigms and Perspectives

The way we think the world is (ontology) influences what we think can be known about it (epistemology), how we think it can be investigated (methodology) and the kinds of theories we think can be constructed about it (Fleetwood, 2005). The net that contains a researcher's ontological, epistemological and methodological premises is known as a paradigm (Guba, 1990).

	Question	**Positivism**	**Phenomenology**
Ontological	*What is the nature of reality?*	▪ Reality is objective and singular	▪ Reality is subjective and multiple as seen by participants in a study
Epistemological	*What is the relationship of the researcher to that researched?*	▪ Researcher is independent from that being researched	▪ Researcher interacts with that being researched
Methodological	*What is the process of research?*	▪ Deductive process ▪ Cause and effect ▪ Static design – categories isolated before study ▪ Context free generalisations leading to prediction, explanation and understanding ▪ Accurate and reliable through validity and reliability	▪ Inductive process ▪ Mutual simultaneous shaping of factors ▪ Emerging design – categories identified during research process ▪ Context bound ▪ Patterns, theories developed for understanding

Table 6. Assumptions of the two main paradigms adapted from (Creswell, 1994)

In research, two paradigms can be identified as extremes along a continuum. At one end is positivism and at the other phenomenology. As one moves along the continuum, the features and assumptions of one paradigm are gradually relaxed and replaced by those of the other paradigm (Hussey and Hussey, 1997) - see table above.

There has been a long-standing debate in the social sciences about the most appropriate philosophical position from which methods should be derived (Easterby-Smith et al., 1991). In between the extremes of the continuum there are numerous possible philosophical positions. Many orientations have been proposed (Easton, 1995), however Guba and Lincoln group together several of the common philosophical positions into four paradigms (Guba and Lincoln, 1994). They assert that for many years these four paradigms have competed to be the paradigm of choice in informing and guiding enquiry, especially in qualitative research. The four paradigms are Positivism, Post-positivism, Critical Theory and Constructivism.

	Positivism	**Post-positivism**	**Critical Theory**	**Constructivism**
Ontology	Naïve realism – "real" reality but apprehendable	Critical realism – "real" but only imperfectly and probabilistically apprehendable	Historical realism – virtual reality shaped by social, political, cultural, economic, ethnic and gender values: crystallized over time	Relativism – local and specific constructed realities
Epistemology	Dualistic / objectivist: findings true	Modified dualist / objectivist: critical tradition / community: findings probably true	Transactional / subjectivist: value mediated findings	Transactional / subjectivist: created findings
Methodology	• Experiment • Statistics • Simulation • Survey	• Experiment • Survey • Case Study	• Action Research • Feminist Studies • Case Study	• Ethnography • Grounded Theory • Phenomenological Research • Case Study

Table 7. Metaphysics of alternative paradigms (adapted from Guba and Lincoln, 1994)

The metaphysics of each paradigm are explained in the above table. Positivism represents the perspective that has dominated physical and social sciences for 400 years. Post-positivism represents efforts to respond to positivism's most problematic criticisms. Critical

theory is used as a blanket term to include amongst others, neo-Marxism, feminism, materialism and participatory enquiry. Constructivism represents a shift in assumption from ontological realism to ontological relativism.

Every researcher approaches the act of research guided and constrained by his/her own traditions, values and beliefs (personal ontological and epistemological premises). The researcher is consequently located in a particular enquiry paradigm. Focused on a concrete problem to examine, the researcher must however move to work with a specific strategy of enquiry (research methodology). This is comprised of a bundle of skills, assumptions and practices that the researcher employs as he/she moves from his/her paradigm to the empirical world. Strategies include case study, phenomenological and ethnomethodological techniques, as well as the use of grounded theory, biographical, historical, action and clinical methods (Denzin and Lincoln, 1994). Located in a particular strategy of enquiry, the researcher may then choose from several methods for collecting empirical materials, for example, interviews, direct observation, analysis of records and artefacts, or personal experience.

3.2 The Research Strategy

With this research is located within the post-positivist paradigm, which asserts that the knower and known cannot be separated and that there is no shared, single reality, the next step is to move into the empirical world and locate a specific research strategy (research methodology), which aligns with the post-positivist perspective and is also appropriate for this particular empirical investigation. The research methodology must meet a number of requirements. First, as realised supply strategy may be formed from a combination of the intended and the emergent, the methodology must be capable of distinguishing between these facets. Likewise, the methodology must be capable of acknowledging that not all managerial intentions are expressed in formal plans, nor that all managerial intentions are subsequently realised (Mintzberg and Waters, 1985). Second, the research methodology must be able to take both strategy content and strategy context into account (Pettigrew, 1992b, Van de Ven, 1992) and enable the gathering of data on both, since these may indicate contingent variables within the supply strategy making process. Third, the research methodology must facilitate the collection of data of sufficient quality, quantity and detail in respect of the research questions.

For real world social research there are three traditional research strategies; experiment, survey and case study (Robson, 1993). In a review of the methodological options for the

empirical investigation of strategy formulation in operations strategy, which is analogous to the formulation of supply strategy, it was concluded that experimentation is inappropriate for investigating a phenomenon as complex and multi-faceted as strategy process (Barnes, 2001). This conclusion excludes action research, which has been used to research strategy process (Platts, 1993), as action research is not generally seen as truly experimental. This is because the researcher deliberately engages with the research rather than remaining independent from it. Likewise, it was doubted whether survey research would provide the rich data set necessary for the investigation of strategy process. Although surveys and statistical analysis are much used in operations management research, it was concluded that surveys are best suited to large-scale data gathering. They are therefore inappropriate for investigating strategy process in which the perceptions and interpretations of events by respondents are likely to play a key role. Case study methodology does, however, offer a workable proposal for the empirical investigation of contemporary phenomena within real-life contexts (Yin, 2003) and is well suited to a research area such as supply strategy process, for which existing theory seems inadequate (Eisenhardt, 1989b).

Case study research

A case research strategy offers three particular strengths (Voss et al., 2002). (1) The phenomenon can be studied in its natural setting and meaningful, relevant theory generated from the understanding gained through observing actual practice. (2) The case method allows questions of why, what and how to be answered with relatively full understanding of the nature and complexity of the complete phenomenon. (3) The case method lends itself to early, exploratory investigations where the variables are still unknown and the phenomenon not at all understood.

A particular concern about case research, however, is its capacity to deliver rigorous research. This is due to anxiety about the ability of researchers to remain impartial and avoid introducing bias to findings and conclusions. Yet, the use of multiple sources of evidence, the development of chains of evidence and the involvement of key informants in the review of case study reports can help to alleviate this concern (Yin, 2003). A second criticism of case study research is the lack of generalisability of findings (Bryman and Bell, 2003, Eisenhardt, 1989b, Voss et al., 2002); in other words, how a single case can yield findings that can be applied more generally to other cases. The response is that case studies, like experiments, are generalisable to theoretical positions and not to populations or universes (Yin, 2003). A case study does not represent a sample. The goal is to expand and generalise theories (analytical generalisation) not enumerate frequencies (statistical generalisation). In this sense, multiple cases can be considered to be like multiple experiments. Consequently,

proponents of case study research advocate adherence to systematic procedures and an analytical approach to conducting case design, fieldwork and analysis (Eisenhardt, 1989b, Voss et al., 2002, Yin, 2003).

Case study research is firmly in the phenomenological rather than the post-positivist paradigm (Yin, 2003). In practice however, case research often lacks any explicit epistemological base. Many cases are no more than a rich description of events (Easton, 2000). Consequently to lay claim to a post-positivist perspective, case study research must be rigorous and creative in seeking out underlying reality. It must be inquisitive. It must look for the root of things. It must disentangle complexities, conceptualise, re-conceptualise, test and retest. If this approach is taken, case study research offers the researcher a methodology well suited to the identification of causal mechanisms as they operate to cause events to happen; unlike histories, case research emphasises the study of contemporary phenomena.

Case research has a long history within management studies and the social sciences generally (Barnes, 2001) and compared with the other two traditions in real world research (experiment and survey), the characteristics of case study research adequately met the philosophical, content, context, quality and quantity requirements of this doctoral study. The following sections address some of the key considerations in the decision to proceed with a case study research strategy.

Reliability and validity in case research

Reliability and validity are important at all stages of the case study research process and consequently, these dimensions are considered here before the distinguishable stages of the research process are discussed. Four tests have been commonly used to establish the quality of empirical social research, including case study research (see table overleaf). (1) *Construct validity* - establishing correct operational measures for the concepts being studied. (2) *Internal validity* - establishing a causal relationship, whereby certain conditions are shown to lead to other conditions, as distinguished from spurious relationships. (3) *External validity* - establishing whether a study's findings can be generalised beyond the immediate case study. (4) *Reliability* - the extent to which a study's operations can be repeated, with the same results. Table 8 outlines how each dimension of reliability and validity might be addressed in case research (Yin, 2003).

Test	**Tactic**	**Applicable Phase of Research**
Construct Validity	• Use multiple sources of evidence	Data collection

	• Establish chain of evidence • Key informants to review draft case study report	Data collection Composition
Internal Validity	• Do pattern matching or explanation building or time-series analysis	Data analysis
External Validity	• Use replication logic in multiple case studies	Research design
Reliability	• Use case study protocol • Develop case study database	Data collection Data collection

Table 8. Case study tactics for four design tests (Yin 2003 p34)

In the research design phase, this study addressed the requirement for external validity by adopting the *Integrative Framework for Strategy Making Processes* (Hart, 1992). This was used to propose conditions in which certain phenomena in the supply strategy making process are likely to be found (literal replication), as well as the conditions when they are unlikely to be found (theoretical replication). This was an important consideration as predicted literal or theoretical replication was a key determinant in case selection.

During the data collection phase the choice of multiple cases and multiple informants, together with the use of other supporting data for the purpose of triangulation and the maintenance of interview transcripts / supporting documentation were used to support construct validity. The reliability of the research was also enhanced during the data collection phase by the use of a case study protocol detailing the study in overview, field procedures and case study questions. In addition, a case study database was created using NVivo qualitative research analysis software to manage sources of data, e.g. transcriptions, data coding, links to websites, company information, observations, etc.

Internal validity, whereby certain conditions are shown to lead to other conditions, can be accomplished by searching for patterns across cases. Qualitative data frequently provides a good understanding of 'why' - which is often a key to internal validity (Voss et al., 2002) - but based on the premise that people are notoriously poor processors of information (Eisenhardt, 1989b) various tactics can be deployed. One is to select categories or dimensions and then to look for within-group similarities coupled with inter-group differences. A second is to select pairs of cases and to list the similarities and differences between each pair. In the data analysis phase of this research the NVivo software was used to code data sources and develop a data framework that was used as the basis for queries about the relationship between data, for the modelling of ideas about the data and the writing of the case studies.

Finally, drafts of the case studies were sent to key research participants in each of the research organisations, who were invited to verify their accuracy. None of the participants requested any changes to the case studies. This enhanced the study's construct validity at the point at which the cases were completed.

Case selection

A primary consideration in case selection is whether a single or multiple case research design is most suited to address the research question. In general, the fewer the number of cases in a research study the greater the opportunity for depth of observation. Nonetheless, a single case risks misjudgement or exaggeration based on a single event and the generalisability of the conclusions developed from one case may be limited. The selection of multiple cases augments external validity and helps to guard against observer bias (Voss et al., 2002). However, when resources are constrained or finite, the selection of too many cases may result in the collection of indiscriminate data. The case selection process must therefore achieve equilibrium between the required depth of observation, the degree of generalisability sought for the conclusions and the data collection resources available.

This research is essentially exploratory; the primary unit of analysis being supply strategy process and the operational unit of analysis the network of actors involved in the formulation and implementation of an organisation's supply strategy including, where appropriate, those outside of the focal organisation who are connected to this process. Since the research questions necessitated that propositions arising from the research would be grounded in diverse empirical evidence (Eisenhardt and Graebner, 2007) and a degree of generalisability was required in the conclusions, a multiple case design was selected over a single case design. Recent examples of case based research in operations management had involved between three and thirty cases (Voss et al., 2002), this range being an indication that each research study is unique and must determine the optimum number of cases for its own purpose. A fundamental constraining factor on the number of cases in this study was that a single researcher would investigate them all. Given that a depth of observation was being aimed for that would provide a rich insight into the processes of strategy formation but with limited resources, it was estimated that four cases each containing interviews with 15 to 20 informants would be achievable and sufficient to provide the richness of data required to establish the external validity of the findings. However, if the investigator began to see diminishing returns from further research activity (Eisenhardt, 1989b, Glaser and Strauss,

1967) the number of cases and interviews could be reviewed. The research ultimately developed four cases (cases A to D) from interviews with 66 participants.[15]

The aerospace sector was chosen for a single sector study for a number of reasons. Most significantly, its slow clock-speed and long programme cycles indicated that the organisations, actors and the parameters of the study were likely to remain stable during the course of the research and would provide case data that could be observed and analysed at a micro-level. A sector's clock-speed refers to the rate of its evolution (Fine, 1999) and although aerospace makes use of high technology components and materials, the evolution of the industry is dependant on the commissioning of high investment, long-cycle programmes. Once developed and qualified by the relevant authorities (e.g. the Federal Aviation Authority in the USA or the Civil Aviation Authority in the UK), an aircraft may remain in service for 30 years or more. Secondly, aerospace is a source of rich case material. Organisations in the sector frequently have intricate supply relationships (e.g. two organisations might interact simultaneously as customer, supplier, partner and competitor) and as a mature sector, aerospace was able to contribute an historic and current perspective to the study (i.e. temporal context). Third, companies in the sector were accessible and geographically convenient (Yin, 2003), due to existing links between the researcher, the University and the companies in the sector.

The major drawback of selecting all cases from one sector concerned the possible uniqueness of conditions in the aerospace sector and whether these would consequently limit the generalisability of the research conclusions to other sectors. Certain conditions are characteristic of particular sectors and can limit generalisability, however, cross-sector comparison is problematic for the same reason. It was therefore accepted that the research findings would be aerospace sector specific. However, other mature, high technology, manufacturing sectors would most likely have broadly similar characteristics to the aerospace sector. The findings of this study could therefore be extended to these sectors and the extent of their generalisability would become the subject of further research.

In hypothesis testing, the population of the cases is crucial because it defines the set from which the research sample is drawn, controls irrelevant difference and delineates the boundaries for generalising findings (Eisenhardt, 1989b). In contrast, the purpose of this research was to explore and understand a phenomenon rather than to test it. Consequently, as

[15] In total 70 semi-structured interviews were conducted with 66 participants to develop the four case studies, i.e. four of the original participants each took part in an additional 'follow-up' interview. In addition to these 70 'main' interviews, another eight were conducted with organisations other than the four case companies. These interviews were undertaken to obtain additional background data relating to the aerospace sector and the research.

proposed for the inductive development of theory from cases (Eisenhardt and Graebner, 2007), theoretical testing was adopted. This is the selection of cases thought to be particularly revealing of the phenomenon under investigation, possibly involving the identification of sharply contrasting characteristics and polar types that highlight the differences being studied (Miles and Huberman, 1994, Pettigrew, 1990). With this intent, four characteristics were identified for use ex-ante in the selection of four organisations for study. These were (1) The organisation's position in the supply chain; (2) The technological complexity of the products manufactured by the organisation; (3) The centralisation or decentralisation of procurement; (4) The organisation's primary focus on military or civil aircraft production.

Prior research experience in the sector led the researcher to an ex-ante understanding that these four variables would be effective differentiators of organisations in the sector. For example, the position of an organisation in the supply chain is a likely indicator of the 'type' of supply activity they will be engaged in. For instance, an OEM might focus mostly on establishing contracts for sub-assemblies to be manufactured by a small number of suppliers and have little or no involvement with the procurement of components and consumables. The reverse is likely to be true for a small engineering company further back along the supply chain. The position in the supply chain and the relative complexity of the products manufactured is also an indication of the likely 'sophistication' of a company's supply activities; i.e. the variety of items purchased, the complexity of supplier relationships, the difficulties the organisation is likely to face with issues such as scarcity, obsolescence, etc. The extent to which an organisation's procurement is decentralised is a possible differentiator of how supply is managed and the degree of autonomy actors may have to formulate / implement supply strategy. Finally, a military end customer is likely to pose different supply challenges for the organisation than a civil customer; in the extent to which a military customer may prescribe certain components and/or prohibit the use of suppliers from certain regions, for instance.

The aerospace supply chain can be broadly represented as three tiers (see below). Tier 1 corresponds to manufacturers of airframes to which all other components and systems are attached. These organisations are usually referred to as 'OEM's' or 'Primes'. Tier 2 represents the manufacturers and integrators of aerospace systems, rather than the suppliers of components. Examples include manufacturers of landing gear systems and fuel computer systems. Tier 3 encompasses the manufacturers and suppliers of components and consumable items, such as machined parts. Two possible case studies were identified in Tier 1 (cases B and C) and two cases from Tier 2 of the supply chain (cases A and D). Tier 3

organisations are predominantly small and medium sized enterprises. On the basis of theoretical testing, Tier 3 organisations were assessed to be generally too small to offer particular insight into supply strategy process, when compared to the organisations in Tiers 1 and 2.

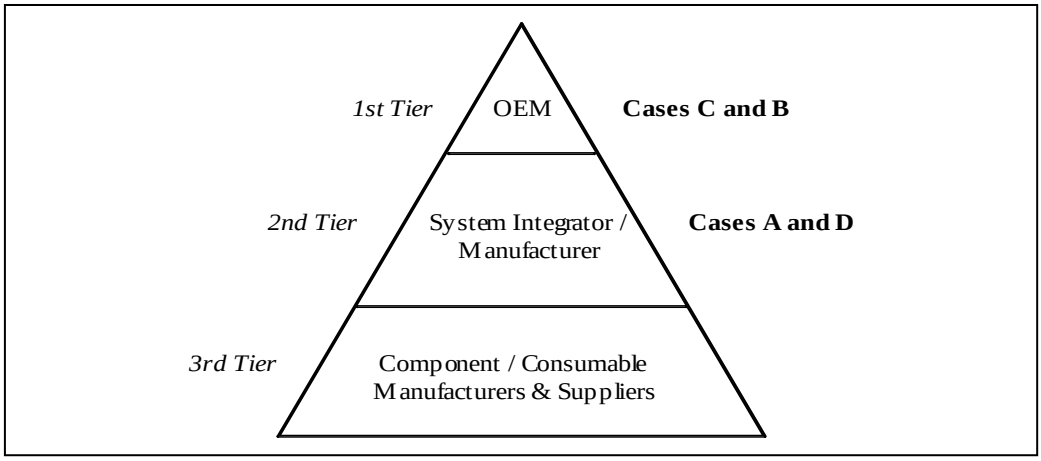

Figure 5. The position of the case study organisations in the supply chain

Having identified four possible case studies, each organisation's products were assessed on a scale of product complexity (see below). This revealed that cases A and B manufactured complex products relative to cases C and D, which were their polar opposites. Each of the cases was subsequently plotted onto a quadrant, the vertical axis representing the degree of product complexity and the horizontal axis the anticipated centralisation / decentralisation of the organisation's procurement function. This analysis positioned one case study organisation in each of the four quarters of the quadrant, indicating that the four cases had sufficiently contrasting characteristics and differences, yet they were also of sufficient size and complexity to warrant exploration of their supply strategy process.

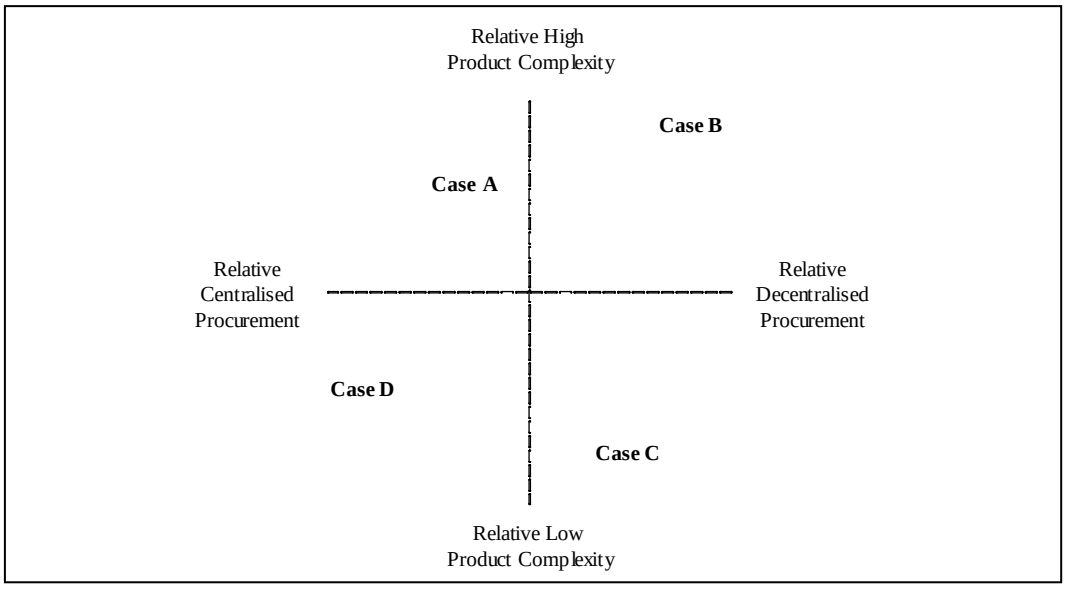

Figure 6. Indicative location of cases by procurement centralisation / product complexity

It was initially thought that the research design would be symmetrically pleasing if the cases could also be divided equally between civil and military aerospace companies (the fourth criterion for case selection). In reality however, most aerospace companies supply both market segments, so selection on this criterion was not feasible. Of the Tier 1 cases selected one manufactures predominantly military aircraft and the other only civil aircraft. Both of the Tier 2 cases supply systems for military and civil aircraft. A brief outline of each of the four organisations selected for study is presented in the following table.

CASE 'A'	A division of a large corporation, company 'A' is a multi-site, multi-national electronic systems provider to aerospace 'primes'.
CASE 'B'	Company 'B' is a multi-national aerospace 'prime' manufacturer of predominantly military aircraft.
CASE 'C'	A semi-autonomous division of a multi-national aerospace 'prime' manufacturer, Company 'C' produces fuselages, empennages and nacelles for civil aircraft.
CASE 'D'	Company 'D' is a division of a multi-national systems provider to civil and military aerospace programmes.

Table 9. The four research case studies

Operationalising the research questions

The objective of RQ 1 – *to classify the scope of supply strategy content and the interaction between supply strategy content and context* - could be relatively simply satisfied by conducting semi-structured interviews and examining documents and other case artefacts. However, it was necessary to 'operationalise' RQ 2 – *supply strategy process 'in practice'* – by considering conceptual resources from other fields. The review of the business / corporate strategy process literature has illustrated that there are many contrasting and complimentary conceptualisations of strategy process that can be brought to the exploration of empirical supply strategy process. Indeed, 'processual research' is considered to be an established field of research (Pettigrew, 1985, Pettigrew, 1997, Van de Ven, 1992). Although there is no commonly shared definition (Lechner, 2005), it is asserted that 'processual research' is a distinct scientific undertaking organised around six principles (Pettigrew and Whipp, 1991):

1. Embeddedness (studying processes across a number of levels of analysis)
2. Temporal interconnectedness (studying processes in the past, present and future)
3. Explaining context and action
4. Searching for holistic rather than linear explanations of process
5. Linking analysis to the location and explanation of outcome
6. Balancing scientific distance and empirical closeness

These principles served as useful initial criterion for the operationalisation of RQ 2. For instance, in 'processual analysis' the inner and outer contexts of the firm are viewed as enabling and constraining influences on the content and process of strategy development (Van de Ven, 1992). Strikingly, however, while the literature includes the analysis of different levels of the firm, sector and economy in processual research, the role of actors in shaping strategy is rarely the subject of study. Since the role of actors has been shown to be a significant omission from the supply strategy process literature, however, this study should not simply seek to replicate processual analysis methodology but, instead, borrow from and add elements to it that would help aid the enquiry. Accordingly, grounded in the objective to explore supply strategy 'in practice' - to make explicit the actions and activities of supply strategy process and the actors that engage in it - and based on an understanding of the conceptual resources that can be brought to the study, three precepts for the operationalisation of RQ 2 were established.

1. The study should explore supply strategy process at multiple levels in the organisation, linked to an explanation of the role of actors play in it

2. The study should explore supply strategy process incorporating a breadth of conceptual resources

3. The study should take into account the contexts in which the focal research organisations are embedded[16]

Hart's *Integrative Framework for Strategy Making Processes* (1992) was subsequently brought into play to address these precepts and bridge the conceptualisations of strategy process in the mainstream business / corporate strategy literature and the role played by actors in supply strategy process.

Nonetheless, while the underlying analysis of actors and process was effective, the 'descriptors' used by Hart in the *Integrative Framework* appeared imprecise for application in a functional context. Consequently, in the operationalisation of RQ 2, descriptors taken from the strategy-as-practice literature were adopted for their greater clarity. During the data collection phase and subsequent analysis, the 'role' of practitioners was operationalised as three factors: the identification of the practitioners (actors), the identification of supply strategy process activity or 'praxis' and the identification of 'practice' – i.e. the routines and procedures of strategy process.

Data collection

An underlying principle in the collection of data in case research is that of triangulation, i.e. the use of different methods to study the same phenomenon. Such methods can include archive analysis, interviews, questionnaires, physical artefacts, observations and the content analysis of documents (Voss et al., 2002, Yin, 2003). Although the terms qualitative and case study are often used interchangeably, case study research can involve qualitative data, quantitative data, or both (Eisenhardt, 1989b). In fact, the combination of data types can be highly synergistic. For example, quantitative evidence can indicate relationships that might not otherwise be evident through qualitative data alone.

Two primary data collection methods were used in this study, semi-structured interviews and the analysis of documents and other artefacts. The semi-structured interviews produced 80 hours of recorded interviews. Interviews are a key source of case study evidence, the method's key strength being the provision of insight into perceived causal inferences (Yin,

[16] The definition of 'context' adopted by this study is based on Pettigrew's description of the 'inner and outer contexts of the firm' (Pettigrew, 1992b) i.e. the firm, the sector and the economy, which are grounded in the assertion that 'variations in context and process shape outcomes' (ibid.).

2003). A three-stage data gathering protocol was developed for this study; (1) a briefing for participants (2) guided questions addressing supply strategy process and content and (3) report writing post-interview. However, respondents were also encouraged to expand their answers and for the interview to pursue new categories of questioning with analytical momentum. The study therefore also benefits from additional rich data acquired during open-ended discussion with respondents around the research topics. Time spent interviewing within the case organisations also presented an opportunity for discreet observation, which was particularly valuable in gathering evidence on the context of each case.

Documents and other artefacts play an important role in augmenting evidence from the interviews. Obtained from current and archive sources, strategy documents, organisational charts, internal communications, presentations, company reports, internet pages, industry reports, published articles and press releases each served to develop context and provide new / corroborating / contradicting evidence. Whereas data collected during the interviews was mostly qualitative, documents provided both qualitative and quantitative data.

Regardless of the intended data collection methods, management research poses particular data collection issues for the investigator (Easterby-Smith et al., 1991). Many directors and vice-presidents are unlikely to grant access to their organisation, particularly to commercially sensitive data and employees, unless they are assured that no harm can result. Many directors are also sceptical of proposed research unless they are able to conceive of it leading to a practical / beneficial outcome. Of the four cases only one required the investigator to sign a confidentiality agreement, but all required several meetings over many weeks before agreeing to proceed. This necessitated the development of a personal relationship with a key contact in each organisation and careful communication about the research's aims and methodology. Once within an organisation, it was then necessary to remain sensitive to the protocol and politics of the host organisation and to adhere to all undertakings concerning confidentiality, trust and ethical conduct. The already established links between the University and the aerospace sector probably helped facilitate initial access to the case organisations; nonetheless access and the conditions relating to access were key contingencies in planning the collection of data.

Data Analysis

Analysing case study evidence is problematical because data analysis strategies and techniques are not well defined for case study research. Helpful analytic techniques have been described in the literature (Miles and Huberman, 1994):

- Putting information into different arrays
- Making a matrix of categories and placing the evidence within such categories
- Creating data displays, for example charts & graphs
- Tabulating the frequency of different events
- Examining the complexity of and relationships in the tabulations
- Using a temporal scheme to order the data

The NVivo qualitative data analysis software used in this study facilitated the manipulation of large amounts of narrative text and other supporting data. However, while analytical techniques and software can be useful and important in helping to manipulate data into a preliminary order, without a broader analytical strategy there is a risk of failing to develop coherent conceptualisations from case study data. This is because there are few fixed formulas and routines to guide the researcher. Three broad analytical strategies have consequently been proposed for case study evidence. The first and recommended method is analysis based on the theoretical propositions present within the research question(s). Alternatively, analysis based on rival explanations or case description can be adopted. (Yin, 2003).

While this investigation is a primarily an exploratory study of a mostly uncharted topic and therefore not based on set of theoretical propositions, in support of the research questions Chapter 2 developed three conceptual frames:

- The 'Integrative Framework' of modes of strategy process developed from the corporate strategy literature, operationalised using the strategy as practice literature
- The theoretical landscape of supply strategy content, defined by subject categories in the supply literature
- The inclusion of inner and outer contexts that shape the content and processes of supply strategy formulation / implementation (Pettigrew, 1992b)

These frames acted as a guide to data analysis in much the same way that research propositions shape the analytical process, by helping to focus attention on certain data within each case study (e.g. actors' praxis and practice; sectoral context; operations / logistics content, etc.), while also helping to identify data falling outside the parameters of the study. For instance, while the 'modes' of the *Integrative Framework* acted as a device for gathering data, as an analysis tool they also enabled supply strategy process to be seen as 'formulation' *and/or* 'implementation' and focused attention onto the praxis and practice of actors. The

'modes', therefore, provided a way to categorise empirical strategy process and analyse how combinations of modes interact together.

Specifically, the process of judging which mode(s) best described the strategy process observed was accomplished by setting up a node in the NVivo data analysis software for each of the five modes described by Hart's framework (1992) i.e. Command; Symbolic; Rational; Transactive and Generative modes. Each mode is associated with a particular 'style' of strategising (see Table 5) which is the product of the 'approach' actors take to strategising and the 'practices' they use. For instance, the Rational mode strategy is an analytical approach to strategising driven by formal structures and planning practices. As the case interviews were analysed and coded, observed strategy process was coded to the mode or modes that were judged to best reflect that behaviour; an observation of an actor(s) following a formal planning system would, therefore, be coded to the NVivo node for the Rational mode of strategising for example.

However, the categorisation of empirical strategy process data is subjective, especially as it can sometimes be difficult to know, definitively, the origin of a strategy. Accordingly - as will be seen in Research Case 'B' – supply strategy praxis at times does not fit decisively into one mode or another; praxis might be categorised as one mode assuming the strategy originated within one group, or as another mode if the view is taken that strategy might actually have originated elsewhere. Consequently, the 'modes' of supply strategy process are a useful lens through which to analyse supply strategy process but in accord with the post-positivist perspective, it is recognised that the 'modes' merely take us a bit closer to 'reality' and not to an 'ultimate' or 'complete' understanding of strategy process. In the analysis of the data, the focus was not so much on whether the classification of praxis to a particular 'mode' was 'right' or 'wrong'. The question at the forefront of the data analysis was always what the process of classification revealed about how actors develop and implement supply strategy.

The conceptual frames helped, in particular, in the creation of a coding structure for the data (see overleaf). Approximately 650,000 words of transcribed interviews were uploaded into the NVivo software for coding and analysis. A form of selective coding (Strauss and Corbin, 1990) was first deployed, in which the frameworks were used to develop core categories around which other categories could be subsequently integrated. Initially, top-level codes were developed for each of the five modes of strategy process. Added to these were codes to accommodate interview narrative relating to praxis, practice and practitioners, content and inner / outer context. As coding progressed, however, a form of open coding (Strauss and

Corbin, 1990) was adopted. New codes were added or removed, divided into sub-categories, grouped with others to form new codes, or developed under separate categories for emphasis. For example, interview narrative on make-buy was coded both as praxis (i.e. the make-buy decision) and as supply strategy content. Significantly, however, unlike Grounded Theory the conceptual frames and the research questions continually guided the exploration of the data and the development of codes.

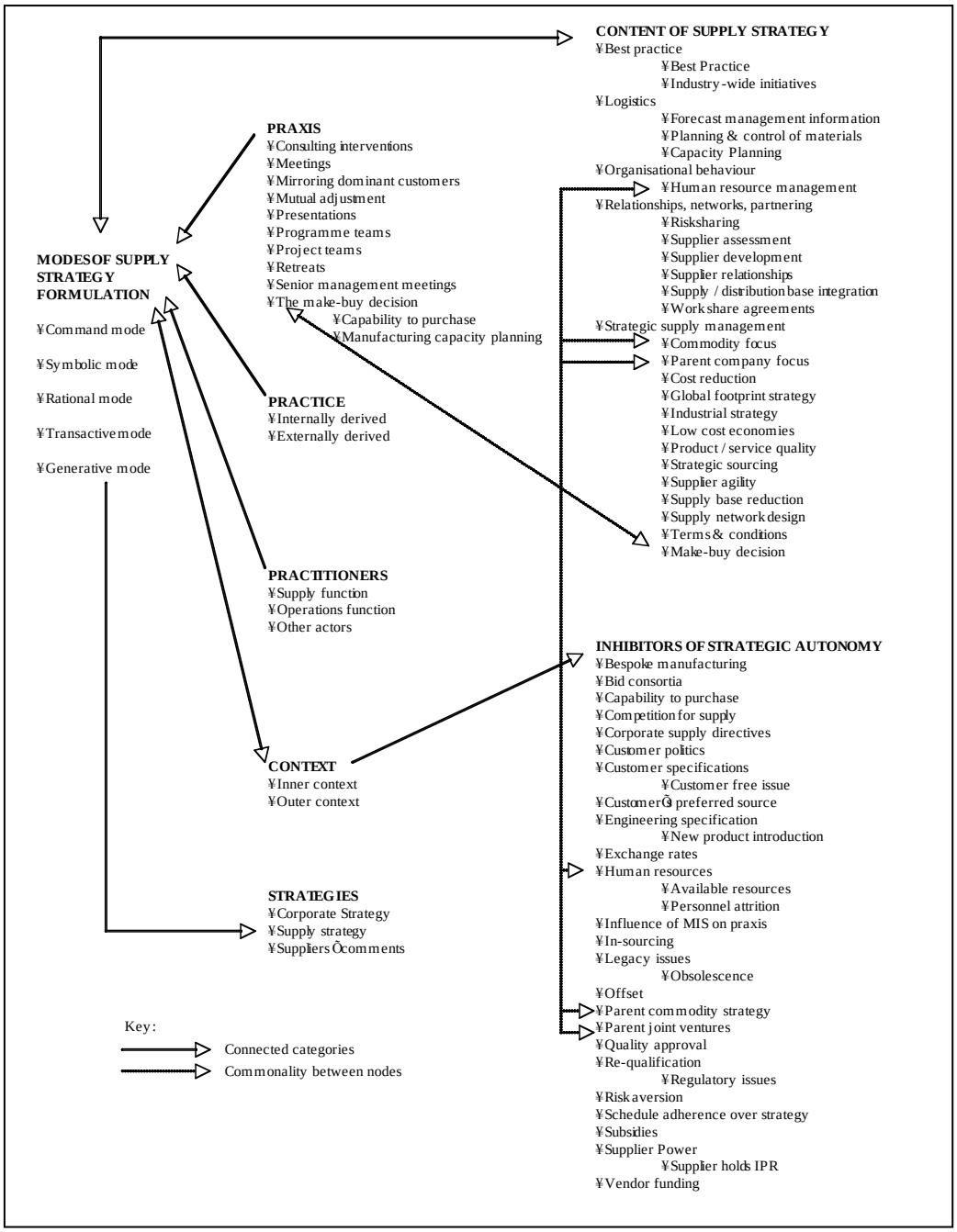

Figure 7. Final coding structure illustrating connected categories & commonality between nodes

By the process of coding and re-coding, themes began to emerge from the data. For instance, the number of references (55) coded to the 'cost reduction' code from multiple sources (27) suggested a focus on that topic. Importantly, however, such observations were only taken as the starting point for further investigation, rather than as having particular significance in themselves. The guiding principle was that the data analysis should not be about sampling and statistical generalisation. Instead, as defined by the post-positivist paradigm, the purpose of data analysis should be to decipher complexity and construct rich explanations about the actors and events that formulate supply strategy, that extend our understanding. Accordingly, as numerically notable and lesser themes emerged, the data was re-examined to (1) understand the context in which the accounts were located and (2) explore whether additional supporting or conflicting accounts existed.

The data analysis process then proceeded through a cycle of inductive (i.e. observation to conceptualisation) and deductive (i.e. conceptualisation to observation) reasoning. Emerging themes were considered in relation to the literature. If the theme was supported in the literature, this was noted as possibly contributing to a general explanation. If the theme was not supported in the literature, the data was re-examined for a deeper level of understanding in the light of known / new literature and these interpretations were noted. On some occasions, this would prompt a re-assessment of the way that element of the data had been coded. Simultaneously, a replication strategy (Yin, 2003) was employed to see whether the observed theme and any developing conceptualisation applied to all, or just some of the cases. The tactic was to search for within group similarities and identify inter-group differences (Eisenhardt, 1989b) and to use various data arrays and matrices to illustrate the results. This processes of moving toward explanation through a cycle of observation-conceptualisation-observation was aided by the functionality of the NVivo software. NVivo enabled the coding structure to be easily manipulated and interrogated and facilitated text searches to discover and code all material on a topic. Likewise, the software made it possible to analyse each participant interview for factors such as meaning, metaphor and context.

As data analysis moved further towards the development of explanation, modelling was used as a way of expressing the relationship between ideas. In particular flow charts, mind-maps, figures, tables and charts were used to develop abstract ideas, conceive the order of processes, form clusters of thoughts, identify gaps in understanding and isolate flawed

thinking. Therefore, models helped to visualise the research holistically and at the same time, assisted in the synthesis of data, themes and ideas into explanation. They were also a useful way of explaining the development of the research findings to others.

Data synthesis

Throughout the data analysis process, the constants were the research frames and questions. These guided the exploration of the data and provided the target that the research was aiming for. Gradually, it became clear the breadth of the data had been analysed. Rather than generalities, the research findings came into sharper focus. However, before proceeding to the further stages of the research and in order to know that the data analysis had reached its conclusion, the explanations were successfully tested for their 'sufficiency' (Richards, 2005), i.e. that:

1. The data explanations had become progressively simpler
2. The explanations could be presented as a coherent narrative
3. Nothing central to the investigation had been left unexplained or ignored
4. The explanations were robust and could withstand the introduction of new data
5. The explanations would make sense to a relevant audience

The on-going process of writing up draft sections of the thesis continued to test the coherence of the data analysis and explanations. On occasion, this prompted further reconsideration of elements of the narrative and re-engagement with the inductive-deductive data analysis cycle. Finally, positive feedback on the study's initial findings following the submission and presentation of a paper to an international conference (15th Annual EurOMA Conference, Groningen, The Netherlands, June 2008) and an invitation to submit a further journal article for publication, accentuated the researcher's belief in the sufficiency of the data analysis.

3.3 A Synopsis of Chapter 3

This chapter has addressed the research methodology chosen for this research study and the philosophy that underpins the selection of these methods. The main points of discussion were:

- Theoretical research paradigms and perspectives
- The location of the study in the post-positivist paradigm
- The selection of a case study methodology
- How the study addressed reliability and construct, internal and external validity at each stage of the research process
- The criteria used for case selection
- The principles adopted for data collection
- The analytical strategy that guided the analysis of the data
- How the study proceeded via an inductive-deductive cycle of analysis towards a synthesis of the data and the development of research explanations

The following chapter – Chapter 4 – presents the four case studies.

Chapter 4.

Case Studies

Chapter 4. Case Studies

Introduction

This chapter presents four case studies ('A' to 'D') based on a total of 70 semi-structured interviews with 66 participants. All of the cases are situated in the aerospace sector but each represents a unique configuration of three characteristics; i.e. their position in the supply chain (cases B and C are Tier 1, cases A and D are Tier 2), the centralisation / de-centralisation of procurement (cases A and D are centralised, cases B and C are decentralised) and their relative product complexity (cases A and B are complex, cases C and D are less complex). All of the cases manufacture for both civil and military customers, although the relative mix of civil and military customers varies considerably between the cases.

- Case A - a division of a large corporation - is a multi-site, multi-national electronic systems provider to aerospace 'prime' manufacturers.
- Case B is a multi-national aerospace 'prime' manufacturer of predominantly military aircraft.
- Case C - a semi-autonomous division of a multi-national aerospace 'prime' manufacturer - produces fuselages, empennages and nacelles for civil aircraft.
- Case D is a division of a multi-national systems provider to civil and military aerospace programmes.

A cross-case comparison of the case organisations is presented on the following page.

Each case is presented, in turn, using the same structure to facilitate cross-case comparisons (see Chapter 5). First, a brief description of each case is given together with details of the interviews conducted with the organisation. Next, supply management practice within the case is explained, followed by an exploration of supply strategy process. Finally, an account is given of the scope of supply strategy within the case.

	Case A	Case B	Case C	Case D
Business Description	A supplier of systems to civil & military aircraft manufacturers	A manufacturer of civil and military helicopters	A manufacturer of business and regional aircraft.	A manufacturer of electrical power systems for commercial and military aircraft
Annual Turnover	U$ 2bn	As a wholly owned subsidiary this information is not separately published. Gross revenue for the parent company in 2008 was Euro 15,037m.	As a wholly owned subsidiary this information is not separately published. Gross revenue for the parent company in 2007 was U$ 14bn.	Circa £100m
Employees	11,000	3500 in the UK	5,000 in the UK	550
Locations	13 sites in the UK & 27 in the USA	The case focuses on the UK manufacturing site. There is another in Italy and smaller offices worldwide	The case focuses on the UK manufacturing facility. Others are located in USA, Canada and Mexico	One site in South-East United Kingdom
Structure	Organised into 4 divisions: • Digital systems & Electrical Power • Mechanical • Engine Components • Customer Services	A 'three box' functional model consisting of *Governance* (i.e. HR & Finance, etc.), *Demand* (i.e. Sales & Marketing) and *Supply* (i.e. Design, Operations, Procurement, etc.)	The UK Leadership Team (see Figure 11) report to the VP & General Manager for the UK, who in turn reports to the parent company. The UK facility is run as a semi-autonomous business.	Case D is a subsidiary within the Electronic Systems segment of their parent company.
Percentage of the manufactured product 'bought in' rather than made 'in house' (by value)	Typically between 70% and 80% depending on the product	Up to 85% of the value of an aircraft depending on the specification	Typically 70% depending on the specification of the aircraft	Typically 85%
Parent Organisation	A FTSE 100 quoted international engineering business with interests in aerospace, security, medical and specialty engineering	A global conglomerate with interests in aeronautics, vertical lift aircraft, space, defence electronics, defence systems, energy and transport. European headquarters and production facilities throughout Europe and the USA, the company has 73,000 employees	A manufacturer with global interests in aerospace and transportation. Quoted on a North American stock exchange, the company has 56,000 employees. In 2007 Europe generated 45% of revenues, North America 36% and other regions 19%	A multi-national group providing systems and services to aerospace and defence industries. A Fortune 500 company quoted on a US stock exchange, with 23,000 employees in 100 locations worldwide.

Table 10. A Cross-case comparison of cases 'A' to 'D'

4.1 Research Case 'A'

In December 2000 a FTSE-100 quoted international engineering business with manufacturing interests in aerospace, security related detection systems, medical products and specialty engineering, merged their aerospace division with the holding company for various specialised engineering businesses. Their portfolio included renowned expertise in hydraulic and actuation systems, advanced propeller systems, turbine engine components, tubular systems and aircraft structures. The combined businesses created Case A, which at the time of the merger became the largest transatlantic aerospace systems and equipment company, with sales revenues of over U$2 billon and more than 11,000 employees worldwide.[17]

Under the leadership of a President and a board of directors / vice-presidents, Case A is organised into four business units: *Digital Systems and Electrical Power* (i.e. flight and mission management systems, electrical power generation), *Mechanical* (i.e. actuation and control systems, propellers, flight refueling), *Engine Components* (i.e. turbine engine components) and *Customer Services* (i.e. maintenance, spares, technical support and publications). These business units operate worldwide but are chiefly located at 13 locations in the United Kingdom and 27 in the United States. Case A is a supplier to the major civil aircraft manufacturers and equips long haul, regional and business aircraft. Case A also supplies systems for military, special mission and transport aircraft, including the Lockheed Martin F-35 multi-role fighter, the Eurofighter Typhoon and the AH-64 Apache attack helicopter.

Between January and October 2006 19 interviews were conducted with Case A employees. Additional 'follow-up' interviews were carried out in August 2007 and February 2008. The participants included three vice-presidents, directors, managers and individual contributors representing corporate functions, customer facing and supply sides of the organisation.

Supply management

Each of the four businesses is organised into sub-units determined by their respective products. Typically, when bidding to win a contract to supply products and services for a specific customer programme (for example, the contract to supply the cockpit display system for a new commercial airliner or the power supply system for a fighter aircraft programme), a business will form a programme team to co-ordinate the bid. A programme manager leads

[17] Source: The company's website, 2006.

the team. If successful, the programme team will remain intact to manage the contract through to final delivery. A commercial contracts function provides a single point of contact for the customer across multiple programmes, manages contract / legal administration and co-ordinates business development.

From the merger onwards, each of Case A's four business units operated semi-autonomously under the umbrella of the corporation, each business unit having its own General Manager. Corporate strategic planning was rudimentary. "This is the first year (2006) that the businesses have produced what they call a strategy and it is probably 20 Powerpoint slides. […] Previously, they had something called their Strategy Document that was financial planning, sales, profit and cash flow for next year" *[Supply Chain Director 3rd July 06]*. Corporately, this data was collated annually into "top and bottom line objectives for the next five to ten years. […] All of that was pulled together by product line, then business, then for the company" *[VP and General Manager 20th July 06]*. "The general managers of the time were completely used to and were very happy with total governance and autonomy over their businesses. They didn't want anyone else telling them how to run their business or limiting their choices" *[VP Strategic Planning 19th July 06]*. Business self-determination likewise extended to supply management. "Each site just had its own set of suppliers and that was it. That was the strategy. There wasn't a need for any high-level thinking" *[Director Electrical Power Systems 3rd July 06]*. With regard to the notion of a corporate supply strategy, "they properly thought that intellectually it was a fine idea, but it just wouldn't work for them. It was a real 'not in my backyard' syndrome. It was a nice idea but do it with someone else please, not with me" *[VP Strategic Planning 19th July 06]*. "If you go back to the beginning of the decade, we didn't have a supply chain strategy at all. Each site procured its own stuff, in its own way and those procurements were not joined up at all. Resistors, capacitors, integrated circuits, that sort of stuff, were procured on blanket orders for the whole of the company, but that was about the only area where we had any sort of leverage" *[VP and General Manager 20th July 06]*.

Over time, the businesses began to carry out less and less manufacturing in-house. "For example, barometric instruments. We used to make the whole thing, soup to nuts. All the little gearing bits, the spindles, the cases, we printed the dials, all that sort of stuff. We did a detailed make versus buy analysis and outsourced the bits that we weren't good at, or the bits we could outsource" *[VP and General Manager 20th July 06]*. "It was almost something like Ford. We didn't quite tip raw materials in at the beginning and pull full product out at the end, but it was along those lines. That has changed considerably. […] It has also changed considerably in terms of what was a mechanically based business, now it is mainly electronics based" *[Director of Procurement 5th July 06]*. Bought in items grew to account for

between 70 and 80 percent of the content of finished products *[Director of Electrical Power Systems 3rd July 06]*, yet despite the increase in the volume and complexity of purchased items, procurement's role relative to the programme teams remained primarily transactional. "A lot of the sourcing strategy was done by Engineering and Operations at the front end of the programme. At that point we had a finished bill of materials. We'd determine who to use for component sub-assemblies and tell procurement to go ahead and get the pricing" *[Supply Director 6th July 06]*. A team leader from the Mechanical business unit explained how they engage with procurement. "We need to outsource to China. There is a whole team identifying suppliers, visiting and reviewing suppliers for capacity and capability. […] Procurement will do the tactical buying once all those pieces are in place. They will have been involved in some of those pieces already but there is a whole big piece of work in the middle where we (the business unit) have to identify suppliers and move work there" *[Director of Supply Chain Integration 5th July 06]*.

Another programme team leader clarified the relationship that his programme teams have with procurement. "They are involved on a daily basis in the meetings and discussions that we have, but that's very much at the tactical level rather than a strategic level. […] This is my strategic plan. In here are sales figures, the forecasts, the customers for all my product types and sizes. […] There was no involvement as far as I am aware from (procurement) in the development of that, nor is there any plan to involve them in the on-going iteration of that. […] I have to have a lot of knowledge and expertise in the areas in which procurement support me, so we do a lot of that ourselves. My technical guys engage with senior people in the supply chain when I need to work on bigger pitch strategies. […] We give procurement an insight into the volumes of the programme, what we're doing, what we're likely to sell. […] When we start getting quotes from suppliers to put together our own cost base, we will say 'procurement we need this, this and this', but my technical people will have already agreed with the suppliers that this is what we want, they can supply it, it will take six months. Procurement just formalise that for us. […] I wouldn't say (they are) a hindrance or an obstacle; (they are) engaged to help when we need it, I suppose" *[Business Development Director 3rd July 06]*.

Supply management was, therefore, chiefly in the hands of the general managers; there was little synergy between sites, no corporate supply strategy and procurement actors primarily functioned as the administrators of supply decisions taken within the programme teams. Faced with significant market pressures, however, the Group President began to once again consider the need for a co-ordinated supply strategy, in particular as a means to manage costs. "Around the world the customer is continually demanding price down" *[Director*

Electrical Power Systems 3rd July 06]. "For the most part, there were no longer cost plus contracts, there were fixed price contracts and we were having to invest our own money in programmes far more than in the past. If we are investing our own money, then we'd better make sure we are investing in the right things" *[Supply Chain Director 3rd July 06]*. "You need to keep reducing your costs on a year on year basis. You need a central supply chain to enable you to reduce material costs. You can't do it independently through the sites" *[VP and General Manager 20th July 06]*. The Group President consequently began the process of appointing a Vice-President of Supply Chain with the aim of creating a centralised, group wide supply chain organisation. Previous attempts to develop a co-ordinated approach to supply management had failed, however. "Attempts had been made to create a global supply chain organisation which had failed because the sites (i.e. the General Managers) wouldn't let it happen" *[Director of Procurement 5th July 06]*. It was therefore recognised that the successful candidate would need the authority and fortitude to confront the status quo. "You can have a structure where purchasing leverage is co-ordinated across sites. That's great if everyone wants to play ball, but where you have a bunch of sites run by mogul emperors, then the amount of co-operation you are going to get is minimal, unless you appoint a major mogul over the top of all the other moguls. The VP of Supply Chain must have power, through a function of organisation structure, information or both. He's got to have more power… more teeth" *[VP and General Manager 20th July 06]*.

Supply strategy process

An external candidate with experience of the aerospace sector was appointed as Case A's first Vice-President of Supply Chain (VPSC) in December 2003. "The VPSC arrived in December and spent a couple of months visiting sites, getting to know the organisation" *[Director Supply Chain Integration 3rd October 06]*. The appointment was recognised as a radical departure for the company. "The fact that they had brought somebody in, that this was their sole job, working for the Group President on the leadership team. […] What the VPSC did was get together all the different procurement heads, other interested parties across the organisation and said 'right, we're going to do this', then set up the organisation. Following that the VPSC had a blank organisation chart and started filling the boxes. It really was a change strategy" *[Director Supply Chain Integration 3rd October 06]*. Each site retained its own procurement function, ultimately reporting to one of the four general managers. However, each site's Procurement Director was also given a 'dotted' reporting line to the VPSC. Some actors transferred from site procurement roles to create the new, central Supply Chain Organisation (SCO) but external candidates were also hired into many of the new roles. "50 percent of the SCO was made up from existing people within the business, so they came from the site procurement role to the central SCO role, but a lot of external people were

brought in. Some would argue that SCO took the interesting bits and left procurement to do the tactical buy" *[Director Supply Chain Integration 3rd October 06]*.

In the absence of an existing supply strategy, the SCO was structured around commodity groups and given the instruction that cost reduction was paramount. "Get cost out of what we procure. It was felt that we could achieve a lot of the cost savings that we needed by leverage, because you would be buying across the whole of the group as opposed to site by site. The strategy was leverage initially, then value engineering and working with suppliers to take cost out of the product. Then a third leg was to reduce the number of suppliers and a fourth leg was the make versus buy strategy" *[VP and General Manager 20th July 06]*. "That first year, for about four months we visited every single site in the US and the UK to talk to the management teams, to explain what we were doing, to talk about the goals that we had and how we were going to achieve them. We had a mixed response. I will admit that there were some sites where it was painful and I was glad to get back on the plane. Other sites it was great. The mistake was communicating to these people and (assuming) it was their responsibility to flow it down (through their site organisation). Some sites do and many sites do not, so as you get further into the organisation I am not at all surprised that people say, 'Supply Chain Organisation, why would I want to talk with them?' " *[Director Supply Chain Integration 3rd October 06]*.

In practice, the SCO met the anticipated resistance from the business units. "The problem was a disconnect between the SCO that was aiming to go off and save money and the businesses that did not want to help. In fact, they were quite unmotivated to help. They were at 90 degrees to what the SCO were trying to do, because they were trying to deliver value in the traditional way. They had a lot of cost saving measures in place, they saw that a lot of the stuff SCO was doing was the business's responsibility anyway. They saw the SCO people basically cherry picking the things the businesses had started and claiming it for their own, or advancing ideas that sounded good but cost a lot of money and time to implement. And who was expected to do that? The businesses not SCO! […] There was a lot of remodelling and fussing while the best was made of a difficult job to realise as many savings as possible and they did disappoint. They did not meet the targets they were asked to. The sites had to step in and come up with many, many millions, tens of millions of savings to fill the gap" *[VP Strategic Planning 19th July 06]*.

Leaders from programme teams were also dissatisfied with the cost focussed approach adopted by the SCO. "In our programme we have a need from the US Government to involve suppliers from particular countries. SCO are reducing the number of suppliers,

whereas our need is to use suppliers that we have never used before to make sure that the aircraft is sold in those countries. SCO has been fairly blinkered in saying this is what we need for the company. The guys on the project are left with how to deal with the US Government. […] You have got a relatively new function (i.e. SCO) with people coming in without aerospace experience necessarily, trying to say you have not been doing a good job for the last 10 years. That's a red rag to a bull. It doesn't gel and you get artificial barriers being put up. […] For example, having literally trawled the world we came up with one supplier in America (for a new technology battery with unique characteristics). We (the programme team) identified the supplier to the SCO who said why couldn't you use the existing supplier? Because these are the only people in the world who can do it!" *[VP Global Engineering 3rd July 06]*.

Conversely, however, some actors recognise the necessity of the stance taken by the VPSC and the SCO. "The VPSC came in with a different approach which was to be very hard-nosed and to make it happen. To be honest, I don't think it would have been possible otherwise; it had to be brutal to make the mark. The VPSC did something that was necessary, which was to make people take notice and take it seriously. The VPSC set up an organisation in a more aggressive and abrupt way than some people might have liked, but it worked and got the SCO recognised and started" *[Director of Procurement 5th July 06]*. Having established the SCO and after an initially uncertain start, the VPSC began to gradually gain the support and co-operation of the general managers, at least on the need to leverage purchasing power across the company. "All the senior leadership and all of the general managers now buy into the VPSC using their staff to help increase purchasing leverage, improve supplier performance and look at what we can outsource. In the past quite frankly, senior leadership had not bought into that at all. Prior to the VPSC none of the senior leadership team bought into that. When the VPSC came along they kind of bought into it but not totally, but they now endorse that process. I think as a function of need. We know we need significant cost reductions in our materials in order to deliver what we need to deliver to our customers. It's market driven" *[VP and General Manager 20th July 06]*.

Having spent two years establishing the SCO, the VPSC retired to be replaced by a new VPSC in March 2006. "He was very good at what he did but it was not his forte to sustain it. Couple that with somebody who wants to retire and you have to change the person. […] We needed the big bang, shake that tree, we will do something different. We are not going to make friends doing that. Yes, we could have done it differently. Yes, we could have got more buy-in from certain areas than we did. […] Could the new VPSC have done what the old VPSC did? Not a chance in hell I don't think. The new VPSC is a different character,

[…] the perfect personality to sustain and build on that, but I don't think the new VPSC would have been the right character to get noticed. It's good that the business has recognised that the person they brought in is a sustaining agent, not a make a difference person" *[Director Supply Chain Integration 3rd October 06]*. "We have done as much as we can do in terms of leverage without getting more sophisticated. Value engineering is still being pushed in the supply chain, but the new VPSC is now looking at the number of our suppliers and getting them to perform better in terms of on-time delivery, quality, etc. So he is looking at the metrics and also how we buy stuff overseas" *[VP and General Manager 20th July 06]*.

Also central to supply strategy process is the make versus buy decision. "Traditionally, make versus buy has been decided by the site and usually developed by Operations, Procurement, and the General Manager of the site, with maybe the Finance people. What has tended to happen is that it has been determined at points as we go along. So at a point in time we might say let's have another look at this" *[Director of Procurement 5th July 06]*. More recently, however, the SCO has begun to participate in the make-buy question. "Operations used to make the make-buy decision, but SCO are much more involved now in the process of deciding what we're going to buy and where we're going to buy it. […] As for ownership of that process, I believe it is up for debate. At the moment it is probably owned by the businesses but there is a strong chance it will end up being owned by the VPSC" *[Director Supply Chain Integration 5th July 06]*. One senior leader clarified, "what we haven't done, but we really need to do for the next three years, is to do a detailed make-buy analysis of everything we do and whether we should make it or buy it. And where we should buy it from; a low cost economy, locally or from where? We're in a position to do that now because the new VPSC has re-jigged our make versus buy policy. That has been around for a long time (5 years) because we worked with an institute in the States to produce a policy. We had hell's own difficulty getting any of the businesses to use it though! They looked at it like turkeys voting for Christmas. Printed circuit board population, for example, absorbs a huge amount of overhead. So if you get rid of it you have to lose overhead to make outsourcing effective (e.g. workforce redundancies). Also, when you run a make-buy there is no solution across the whole business. Certain boards you should outsource, others you shouldn't" *[VP and General Manager 20th July 06]*.

Under the direction of the new VPSC, actors within the SCO are beginning to codify the supply strategy. "We are in a transitional phase where we are looking to formalise (supply strategy) at our larger sites, so that we come up with a sourcing plan at the bid and proposal stage that matches our preferred supplier base, our technology roadmaps. Right now, I would say we are in the infancy of it" *[Supply Director 6th July 06]*. An actor within SCO explained their involvement. "One of the things we are starting to do is talk to the businesses about

formulating sub-contract strategy upfront, prior to bidding to the customer. The past six months is the first time we have formally formulated a strategy and there is no process to do it. It has literally been what are the business strategies, what other things do we need to be aware of like low-cost economy sourcing? Then, pull all of that together, brainstorm it and work out what are the supply chain strategy strands that we need to put in place to support what the businesses are doing" *[Supply Chain Director 3rd July 06]*. Others echo the sense of being in the early stages of the development of supply strategy. "We haven't formally addressed the products we make and said, make versus buy and what should we be doing from a procurement point of view? Should we be concentrating on developing our supply chain, standardising our processes? I don't see that we have gone through a formal process to develop our supply strategy. The new VPSC has come in, been dropped in the deep end and we have been doing some good stuff, but have we actually stood back and asked what is our supply strategy and tried to develop it through a formal process? I don't think we have" *[VP and General Manager 20th July 06]*.

As a consequence, within site procurement and the businesses there remains a degree of uncertainty about the emerging supply strategy. "The approach taken by the old VPSC was price, price, price. So I guess that was the strategy, to knock so many millions off prices. In conversation with the new VPSC I feel that he is following an approach to start with what is core and what is not. What are you trying to put where? Looking at costs rather than prices, supplier development and on-time delivery. I haven't seen that down on paper yet, but I have had a number of conversations that suggest we are leading to that point. […] My feeling is that in some of the other businesses it's not going there yet, but maybe I'm close enough to it" *[Director of Procurement 5th July 06]*. Actors also acknowledge the continuing disconnects between SCO and in particular, site procurement. "The core competencies most businesses are identifying are systems engineering, programme / sub-contract management and that is it. No manufacturing, maybe some final assembly and test but it is completely turning everything on its head. An individual involved in quoting a customer at the bid and proposal stage will likely call (SCO) and say 'we're quoting this, anyone else you want me to go to?' So there is a connection there, but when you get into the real nuts and bolts, day-to-day executing purchase orders, are we joined up with a supply strategy? Probably not…" *[Supply Chain Director 3rd July 06]*.

Figure 8 (overleaf) illustrates the interaction between the business units and the SCO, and the relationship between the product / programme teams and Procurement within each business unit. The figure also highlights the SCO's focus on 'leveraging spend', their intent to codify strategy and SCO's growing involvement in the make-buy decision.

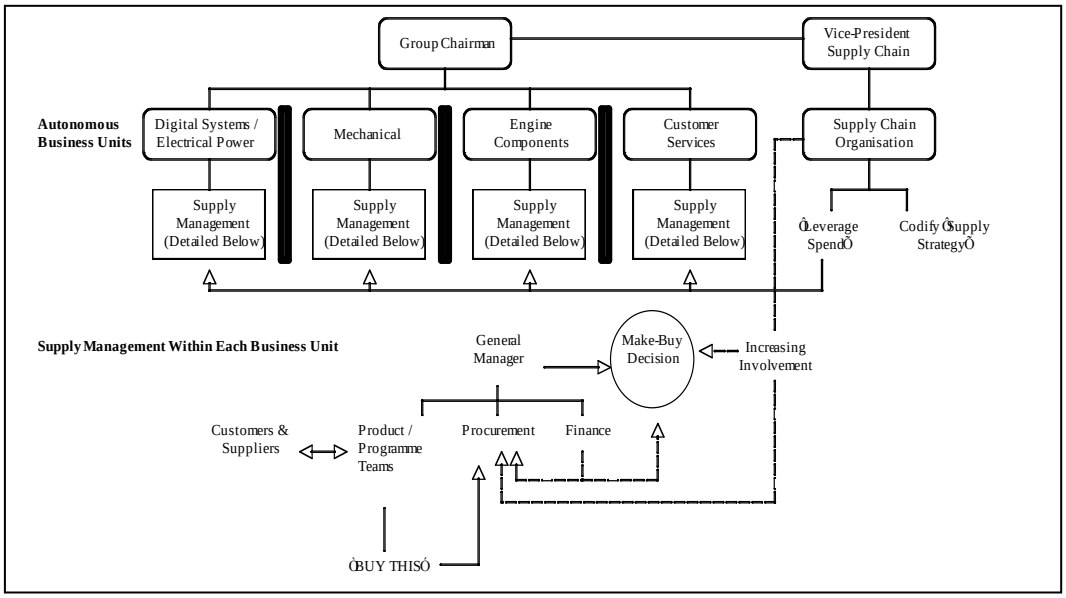

Figure 8. Case 'A' supply strategy process

The scope of supply strategy

Since the appointment of the first VPSC in December 2003 and as a function of their competitive environment, the primary strategic objective for Case A and the SCO has been cost reduction. "There are a few cases where the strategy is intended to form a supply chain to meet your (programme team) requirements, the rest is all about low cost" *[VP Strategy and Customer Accounts 19th July 06]*. The scope of Case A's supply strategy has, therefore, intently embraced cost reduction practices such as working with suppliers to take cost out of the product, reducing the overall number of suppliers (i.e. increasing relative purchasing power via constrained preferred supplier lists) and ultimately, the intention is to outsource all uneconomic manufacturing activity, unless identified as a strategic core competence. "I think there will be a time when it will be broader than that, but I think we are still in a fairly young evolutionary form of a supply chain at the moment. At the moment, the things that are important to us are how do we get price down, i.e. leverage, then how do we get cost out of the material base? I think we will go up a notch in terms of our role as a tier one supplier. What elements of the supply chain do we need to control to minimise the risk for our customers? Also, process standardisation and how many tiers within the supply chain are we going to manage? All of that is going to come, but at the moment we are at a fairly immature stage of grabbing hold of what we do and doing it better" *[VP and General Manager 20th July 06]*.

In the meanwhile, the SCO is attempting to bring together at one point in the organisation disparate strategies from the businesses with centrally formed commodity strategies, insofar as these exist. "The businesses look at their product strategy, their operations strategy and their supply strategy in order to deliver top and bottom line (financial) performance. The businesses cannot do the supply strategy on their own; they have to do it with the VPSC. At the top level will be some cost savings, in terms of procurement cost savings for the next three years. It will be broken down into action items in terms of leverage, value engineering and outsourcing. There will also be metrics for on time delivery and quality" *[VP and General Manager 20th July 06]*. Within the SCO the intention is assemble these plans with commodity strategies to produce a first attempt at an integrated supply strategy for the Group. "We are now at the point where we are trying to finalise in one place all our supply chain strategies. I have siphoned it down now to this is our sourcing strategy; this is our cost reduction and our processes. Businesses are only interested in their bit so I am only communicating what they want to know. I have done Digital, I am starting Mechanical and we are doing Customer Services. So, we are integrating it that way and we have to take this cube and integrate it with the overall strategic plan for the company" *[Director Supply Chain Integration 3rd October 06]*. The resulting outcome might be critiqued as too narrowly focussed and simplistic, "a whole lot of line items that says what we are going to do to deliver cost reduction. Nonetheless, saying I am going to have a scrap reduction plan that is going to save half a million pounds is not a strategy it is an intent. So, how are we going to achieve that? We have started to do the 'how' bit" *[VP and General Manager 20th July 06]*.

No matter how successful Case A proves to be in formulating a unified supply strategy, the appointment of the two VPSC's and the development of the SCO can be viewed at the same time, as an intervention by Case A's Group President to address and curtail the power of the semi-autonomous general managers. From the merger in 2000 onward, the general managers represented a major obstacle to progressing the co-ordinated approach to supply management that the company needed in order to respond to the cost reduction requirements of powerful aircraft manufacturers and governments. However, by 2006 the general managers were supporting the development of increased purchasing leverage across the businesses. This represented a significant first step towards centralised control. While potentially much more controversial issues such as ownership of the make-buy process had yet to be broached with the businesses, it was thought highly probable that the next stage in this process would be for the procurement directors at each of the sites to have their

reporting line switched so that they would report directly to the VPSC and have only a 'dotted' reporting line into their business general manager.[18]

[18] As a footnote to this case study, it was announced in January 2007 that Case A was to be taken over by a major North American conglomerate for £2.4bn (U$4.8bn). This transaction was finalised in May 2007. It is interesting to speculate that the fact that Case A had not progressed further in formulating strategic supply strategy, may have made Case A an attractive target for a company with an existing strategic supply infrastructure able to realise its advantages.

4.2 Research Case 'B'

In 1995 a UK based defence group acquired a helicopter manufacturer. A decade previously, the manufacturer had been saved from bankruptcy amid much negative publicity and Government intervention, by the forming of an alliance with an American company to manufacture one of their models under licence. At the time, major orders for this troop carrying / attack helicopter were anticipated from the Middle East. The subsequent success of this venture and another with a European helicopter manufacturer for a 16 tonne multi-role helicopter returned the company to profitability. In 2001 the UK defence group and the industrial group that owned the European manufacturer formed a 50/50 joint venture company to further their association. This arrangement lasted three years until the industrial group purchased their UK partner's share and merged their entire helicopter manufacturing operations. The resulting company, Case B, manufactures helicopters for civil and military use in international markets. Their product portfolio covers light, single turbine aircraft of less than 1.8 tonnes through to heavy aircraft of more than 16 tonnes, as well as specialist, attack and naval models. The company has developed a network of alliances with other manufacturers and participates in a number of joint venture / collaborative programmes. These have included collaborations with Lockheed-Martin and Boeing in North America, NH Industries in Europe and Kawasaki in Asia.[19]

Focusing on Case B's UK manufacturing facility, during August to December 2007 this study recorded 19 interviews with Case B managers and executives including a senior vice-president and the general manager of a key supplier. The UK site is a low volume manufacturer of specialist helicopters, producing 12 to 15 aircraft per year generally for military customers. The site also provides after-market repair and overhaul support. The UK site contrasts markedly with Case B's other European manufacturing site, which is expected to produce 250 helicopters for the civil aviation market in 2009. Where the European operation is able to schedule production runs of generic aircraft (known as 'white tails') with a limited range of customer options much as is the practice in the automotive industry, each UK produced aircraft is individually crafted to the customer's exact specification. A UK built helicopter is typically equipped with considerably more technology than its civilian counterpart, most of these systems are manufactured by external companies and specified by the customer to be fitted to the aircraft rather than being designed into the aircraft by Case B's engineers. Despite the large difference in the volume of aircraft manufactured, turnover

[19] Case B's parent company is a global conglomerate with interests in aeronautics, vertical lift aircraft, space, defence electronics, defence systems, energy and transport. With European headquarters and production facilities throughout Europe and the USA, the company has 73,000 employees. Gross revenue for 2008 was Euro 15,037m.

and profit for the European and UK operations are roughly equivalent. Approximately 55 percent of the UK's revenue is derived from the repair and overhaul of aircraft in the field, rather than from the manufacture of new helicopters. Case B employs in the region of 9,000 people worldwide and 3,500 of these are based in the UK. The UK site's operating model consists of three functions: Governance (e.g. CEO, Human Resources and Finance), Demand Side (Sales / Marketing subdivided into commercial, military and US Government business units) and Supply Side (Operations, Procurement, Engineering and Product Support).

Supply management

Typically, supply management represented by Procurement is asked to provide estimated cost and delivery schedule information when Sales / Marketing are engaged in bidding for a customer's order *[Head of Procurement Operations 26th Nov. 07]*. When the customer places their order a team is created, with a programme manager as its leader, to manage the order through manufacturing to final delivery. Other members of the programme team are co-opted from the demand and supply sides of the company configuring resources "into particular project teams to deliver a certain programme" *[Head of Procurement Development 14th Aug 07]*. Up to 85 percent of the value of an aircraft may be bought-in rather than made in-house *[Business Unit Director 5th Nov. 07]* although the exact nature of Procurement's engagement with an aircraft programme varies according to the requirements of each customer. To illustrate using an order from Case B's principle customer as an example (see also figure overleaf), the Programme Team's first step is to identify those items that will be supplied directly from a third party on the customer's instruction. For instance, a specialist contractor will have developed a military helicopter's communication or weapons systems for the customer. The Programme Team's role is therefore to liaise with the external supplier and facilitate the inclusion of the system on the helicopter platform rather than to make or procure it. Likewise, items with a value of greater than £1m are excluded from Case B's procurement process. These items are tendered via the customer's own processes. Of the remaining specification, Case B's protocol is for rotors, transmissions and electrical looms to be designated for in-house manufacture. The remaining items fall into one of three categories. Production engineers specify many items and where they are to be sourced, for example fuel pump Model X from manufacturer Y. Some items such as fasteners are consumables and these are purchased against long-term contracts. Only items that are manufactured to a Case B design (known as 'build-to-print' items) are managed through Procurement's tender process. These example processes are illustrated in Figure 9 (overleaf).

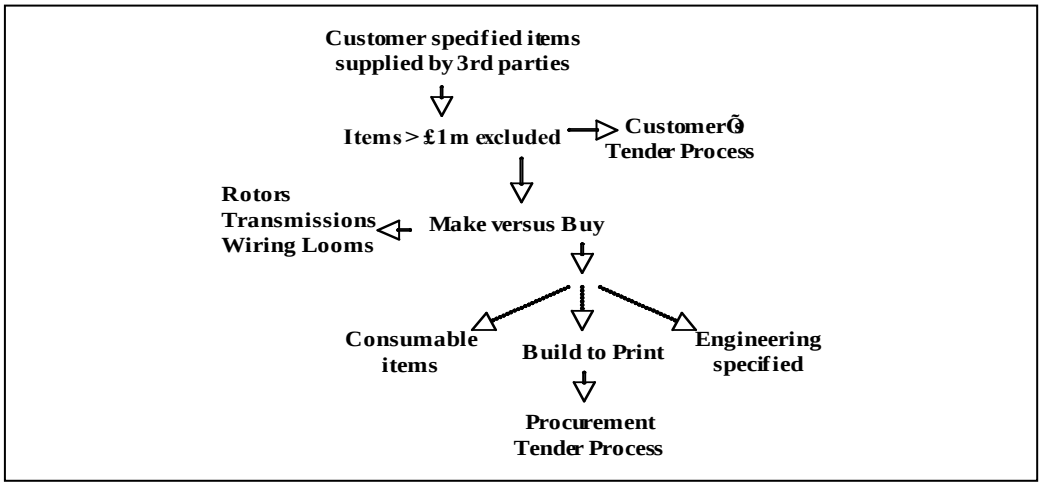

Figure 9. The supply strategy process for Case B's principle customer

Case B work with approximately 400 suppliers *[Head of Support Solutions 14th Nov. 07]*. These range in size from UK based small or medium sized businesses to multi-national original equipment manufacturers. About 80 percent of Case B's spend goes to 20 percent of their suppliers *[Head of Procurement Development 14th Aug. 07]*. There is little commonality between the European and UK supply bases *[Ibid.]* but the company is seeking to address this and "rationalise" *[Procurement Director 29th Nov. 07]* the total number of suppliers. Located in a separate building from Procurement, the Operations function manages expediting and material logistics once Procurement has placed a purchase order with a supplier.

Case B does not have a written supply strategy and does not have a prescribed process to formulate supply strategy. Respondents reported that supply strategy is "absent in its written form" *[Head of Programme 14th Nov. 07]* and there is no supply strategy document "to pull off the shelf" *[Head of Procurement Development 14th Aug. 07]*. However, rather than being "deliberately designed" *[Business Unit Director 5th Nov. 07]* supply strategy is perceived to "evolve" *[ibid.]*. Actors discern that supply management routines and procedures, activities and decisions coalesce to form supply strategy. There is also a reported sense of supply strategy being "fledgling" *[Procurement Director 29th Nov. 07]* and "in the process of development" *[General Manager 20th Dec. 07]*.

Supply strategy process

Case B's make-buy protocol was formed by senior management who regard the dynamic systems of a helicopter to be critical in-house manufacturing capabilities, which together with internal design, systems integration and final assembly, they relate to as the defining characteristics of helicopter manufacture *[Head of Procurement Development 14th Aug. 07]*.

Consequently, all electrical looms, transmissions and rotors are made in-house, together with some machined parts. Unless a supplier is unable to provide the small quantities of a specialist item required for a helicopter programme, no other make-buy analysis is generally conducted *[Senior VP Industrial Strategy 26th Nov. 07]*. Similarly, no make-buy decisions are imposed on the UK site by the parent organisation *[Head of Programme 13th Nov. 07]*, even though the European site has a wider in-house manufacturing capability, for example in airframe structures *[Head of Procurement Contracts 13th Nov. 07]*. The UK site buys its airframes from an external manufacturer in Poland. Fearing an unexpected downturn in the market the UK site has been cautious about increasing its in-house manufacturing capacity in line with the growth in its order book. One respondent lamented that for the last five years the UK site has consistently "gone wrong on the issue of capacity planning" *[Senior VP Industrial Strategy 26th Nov. 07]*.

With regard to bought in items, externally derived, generic conceptual models such as purchasing portfolio matrices (Kraljic, 1983) and Porter's models for competitive analysis (Porter, 1980, Porter, 1985) are familiar frameworks *[Head of Procurement Development 14th Aug. 07]*. Organisation specific practices also feature; for instance, the company has developed in-house / in partnership with academia a supplier relationship management matrix categorising four levels of supplier relationship (commodity, contract, performance partner or strategic alliance). The matrix is purely descriptive and does not prescribe the supply management activity to be associated with each relationship. The UK site also has a supplier assessment tool (SAT) for use in supplier selection decisions. The tool is a step-by-step guide to supplier assessment but it is inconsistently and irregularly used *[Head of Procurement Contracts 13th Nov. 07]*. Consequently, these routines and procedures appear not to be influential in formulating supply strategy. In contrast, customer routines and procedures have a proportionately much greater influence on how supply strategy is formed. For instance, as previously noted Case B's primary customer defines how the tender process for major equipment in excess of £1m is to be carried out and similarly, the customer's decision processes that result in the selection of an external provider for a system on a helicopter programme (e.g. radar or weapons systems), externally impose a strategic supply relationship on Case B that they must subsequently manage for years and possibly decades, given the lifecycle of most aircraft programmes *[Business Unit Director 5th Nov. 07]*.

Nonetheless, the activities and decisions of the helicopter programme teams are arguably an even greater driver of supply strategy. Described as dominated by "big personalities" [*Head of Procurement Development* 29th Nov. 07] from Sales / Marketing and Engineering, strategic supply decisions for each programme are generally made by the programme manager or arrived at

through discussion within the programme team in consultation with Engineering [Key Supplier Account Manager 13th Nov. 07; Supply Chain Development Manager 29th Nov. 07], taking into account any offset obligation agreed with the customer.[20] Procurement's involvement in these discussions is regarded as minor and in the main Procurement is required to only provide cost and schedule information to the decision makers. It was reported that within Procurement "the dominant personality types aren't there, so you don't get engaged in the right business debates. […] You're very much held at arms length and you're told what the answer is. You're told what the strategy is going to be and so Procurement as a function doesn't hold the respect" *[Head of Procurement Development 29th Nov. 07]*. This state of affairs is viewed as self-reinforcing whereby "if you don't have a strategy to offer, then others will naturally fill the vacuum. They will tell you what the strategy is because you have failed as a function to play your role in the game" *[ibid.]*.

The relative position of Procurement, Engineering and Sales within the programme teams derives from the direct interaction that engineers and sales people have with strategic alliance and other significant suppliers [*Head of Procurement Development* 14th Aug. 07]. Case B's relationship with their suppliers is rarely managed by Procurement but "quite often managed via the Sales and Marketing Team, or the Offset Team, or the Programme Team, or the Engineering Team" [ibid. 29th Nov. 07]. Engineers discuss on-going technological innovation with suppliers, product comparisons are made and the most promising developments are incorporated into future Case B product offerings by Sales / Marketing. Suppliers often ensure that engineers design their products onto a helicopter "before Procurement have had any influence" *[Procurement Marketing Manager 26th Nov. 07]*. In some cases, a supplier will directly influence a Case B customer to specify their products for a helicopter programme, or the customer will have "already bought the system and they will free issue it [so that] we have to integrate the aircraft around a particular system" *[Procurement Director 29th Nov 07]*. Excluded from these discussions, Procurement's role has consequently evolved to be mainly transactional and clerical [ibid.], overseeing "fair and equal" *[Head of Support Solutions 14th Nov. 07]* practice in supplier competitions, negotiating terms and conditions *[Head of Programme 13th Nov. 07]* and processing contracts / purchase orders *[Head of Procurement Operations 26th Nov. 07]*. It is acknowledged that Procurement "do provide a bit of glue, bless their cotton socks" *[Head of Programme 13th Nov. 07]* in their efforts to bring order to the supply decisions made by each programme, but their labours are considered to be not "very smart" *[ibid.]*.

[20] The way in which programme team members are selected is described as "arbitrary" *[Supply Chain Development Manager 29th November 2007]* and may, therefore, inadvertently exclude key actors. "If you know of all the people to be involved then you can involve them. If you don't you could very easily miss them and we have a lot of situations […] where you've not involved everyone and therefore you've gone off down a particular track and actually it doesn't serve someone who you forgot about completely" [Procurement Marketing Manager 26th Nov. 07].

During the previous three years Procurement had established the role of Key Account Manager to manage Procurement's relationship with a small number of key suppliers. The aim was to improve key supplier performance and increase Case B's leverage through the acquisition of knowledge about that supplier *[Head of Procurement Development 29th Nov. 07]*. The idea is that when the buyer is sitting across the negotiating table from a key supplier, they are "armed with as much knowledge as possible to be powerful on the day" *[ibid.]*. The 'buyer' negotiating directly with the supplier may not be from Procurement, however. "It could be our Chief Operating Officer, it could even be in extreme cases our Chief Executive, […] our CEO effectively acting as our Chief Buyer" *[ibid]*. This underlines that Procurement are often not the principle point of contact with suppliers, and Key Account Managers are perceived to be "the person in the middle, acting as a go between; […] the referee as well as the person to facilitate" *[Procurement Manager 5th Nov. 07]*.

Conversely, the programme teams enjoy a high degree of status and strategic autonomy, a position strengthened by the practice of assigning supply budgets to the Programme Manager rather than to Procurement *[Head of Procurement Development 29th Nov. 07]*, so that "Procurement can't place an order without the Programme Manager giving the internal supply contract to place that order" *[Business Unit Director 5th Nov. 07]*. Programme managers typically involve themselves and the Programme Team in the supply strategy for high value and/or "politically sensitive" *[Head of Procurement Development 29th Nov. 07]* items such as the helicopter's radar or engines, if the customer does not specify these. The process is described as "round table debate" *[Business Unit Director 5th Nov. 07]* involving the Programme Team, Engineering and Operations, and results in an instruction to Procurement "to go and buy that" *[Head of Procurement Development 29th Nov. 07]*. It is evident that "what is being designed to go on the aircraft and any preferences definitely come out of the Engineering Programmes and Sales cluster of function" *[Key Supplier Account Manager 13th Nov. 07]* and the Programme manager will "influence the decision […] and to some degree where it will be procured" *[ibid.]*. The supply strategy for the programme is consequently not externally imposed, by the Head of Procurement for instance, but is instead largely formulated or "made up" *[Head of Programme 13th Nov. 07]* within each programme team. One respondent commented that "nobody comes to you at the start of a project and says this is the maximum amount of inventory you can have, this is what you are doing. There is no strategy for it" *[ibid.]*. Likewise, "nobody is looking at the overall potential" *[Key Supplier Account Manager 13th Nov. 07]* for synergy across all programmes, because supply strategy is formulated singularly, programme by programme. Outside of formal discussion within each programme team, impromptu discussions take

place between actors "kicking a few ideas around" *[Procurement Marketing Manager 26th Nov. 07]* or are arranged to "resolve issues" between functions *[Head of Programme 13th Nov. 07]*.

Less high value / less politically sensitive commodities, such as pipe work or brackets, are left to Procurement to recommend a source of supply that will be "signed off" *[Business Unit Director 5th Nov. 07]* by the Programme Manager. More recently, conditions have required Procurement to develop supply strategies for these commodities in the search of lower costs and better supplier performance. Traditionally, Case B's relationship with their dominant customer was 'cost plus', meaning that the customer would meet all costs incurred by Case B and add an agreed percentage profit margin to the total. Consequently, the company viewed functionality / performance as more important than cost and engineers and designers made supply decisions.[21] However, a review of defence spending in 2005 replaced 'cost plus' with fixed price contracts. This change, in particular, heightened Case B's awareness of the need to develop commodity strategies *[Ibid.]*.

The problem they faced was that although a supplier may be strategically important to Case B, "in a lot of cases [we] are not strategic to the supplier" *[Procurement Manager 5th Nov. 07]*. Despite their willingness, Case B is unable to manage many suppliers because Case B is not a significant customer and the supplier has "a lot more clout" *[Business Unit Director 5th Nov. 07]*. Likewise, many suppliers hold the intellectual property rights for key commodities *[Head of Industrial Participation 5th Nov. 07]* and developing leverage with a supplier can be undermined by the complex nature of relationships in the industry *[Head of Programme 13th Nov. 07]*. For instance, a third party might simultaneously be a supplier, a customer, a partner and a competitor. Nonetheless, Procurement subsequently identified 28 commodity types and began a process of desk analysis, examining what was being purchased and from whom. Suppliers were assessed using the SAT methodology. Cross-functional teams were also formed to consider commodity requirements relative to future helicopter designs and predicted sales *[Procurement Manager 5th Nov. 07]*. Three commodity strategies emerged from this activity - non-structural composites, rigid pipes and fabrications *[Procurement Marketing Manager 26th Nov. 07]* - although significant difficulties were encountered.

To be effective, a commodity strategy must dovetail with Case B's product development strategy, its marketing strategy *[Head of Procurement Contracts 13th Nov. 07]* and across all helicopter programmes *[Procurement Director 29th Nov. 07]*. In practice, however, actors from

[21] The only protocol required by the parent company is the necessity for a group company to be included in the tendering process if one can potentially satisfy a requirement *[Procurement Marketing Manager 26th Nov. 07]*.

other functions were often "not available to pull in on demand" *[Procurement Manager 5th Nov. 07]* to participate in the information sharing process and elements of the business strategy did not "exist in a mature enough form to allow us to flow (i.e. to formulate) clear supply strategies" *[Head of Procurement Development 14th Aug. 07]*. One explanation for the perceived lack of strategic direction is that Case B is very cautious about revealing the details of its business strategy, even internally. Executives fear that once "it becomes common knowledge among employees it drifts out and someone else will pick it up" *[Senior VP Industrial Strategy 26th Nov. 07]*. Consequently, they "keep things constrained to just the individuals that need to work on them, which can be a little bit difficult for everyone else, because […] it never gets revealed to them" *[ibid.]* Consequently, Procurement's view is that over three years they learnt a lot about the process of developing commodity strategies. "We have learnt that, actually, it has been pretty fruitless in many ways" *[Head of Procurement Development 14th Aug. 07]*.

Case B's supply strategy accordingly progresses through stages of both formal analysis and emergent / informal process. At the beginning of the process, Case B's make versus buy protocol is intended to take advantage of critical in-house manufacturing capabilities, arrived at in the process of formally analysing Case B's competitive strategy. Supply decisions are subsequently formulated by the managers responsible for each helicopter programme / customer order and their cross-functional teams, in liaison with Sales / Marketing, Engineering, Operations and influential suppliers. Strategic supply decisions with these teams are arrived at through informal processes of debate and mutual adjustment, rather than through formal analysis. While these decisions are high value and/or "politically sensitive" *[Head of Procurement Development 29th Nov. 07]* and arrived at through informal process, it is notable that lesser supply decisions are left to Procurement who deploy a range of formal analytical processes, e.g. SWOT analysis, purchasing matrices, tendering processes, SAT and commodity strategies.

Figure 10 (overleaf) illustrates the interaction between the actors engaged in supply strategy process – e.g. customers, programme teams, procurement, operations, suppliers – and the 'nature' of those interactions – e.g. instructions from the programme teams to procurement to 'buy this' or 'tender for this'. The figure also seeks to highlight where / how key strategic supply decisions – such as the make-buy decision are made within Case B.

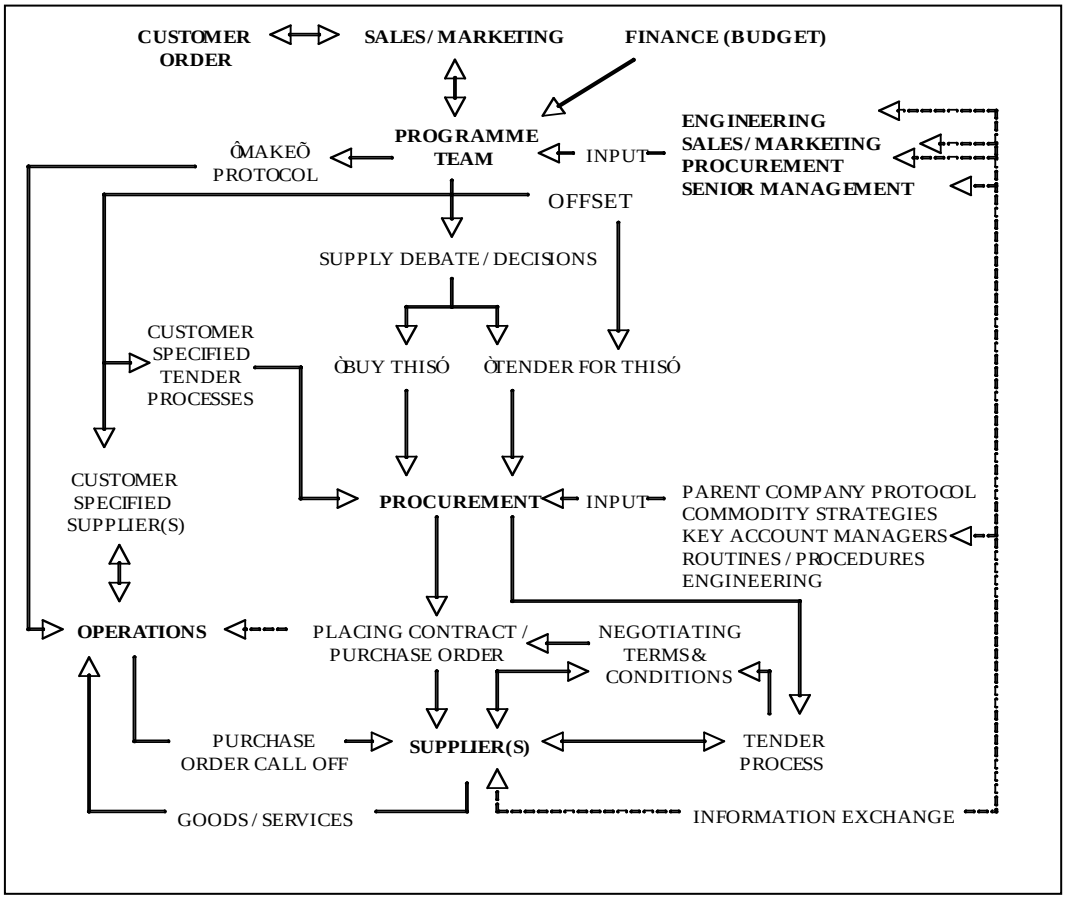

Figure 10. Case 'B' supply strategy process

The scope of supply strategy

Case B's fundamental pursuit of cost reduction is a pattern manifested in the decisions that formulate supply strategy, whether through the creation of commodity strategies, establishing low cost economy sources or supply base rationalisation. Having secured availability, Case B's next consideration is to "drive more attention on margins" *[Key Supplier Account Manager 13th Nov. 07]*. Procurement actors are "heavily driven on cost" *[Supply Chain Development Manager 29th Nov. 07]*, sourcing where they "can get it the cheapest" *[ibid.]* and focussing on the "best price, best lead time" *[Procurement Marketing Manager 26th Nov. 07]*. Procurement is encouraged to not grow the supply base beyond its current size, "many would say the existing supply base is too large and what you really ought to do is rationalise it" *[Head of Procurement Development 14th Aug 07]*. The reasoning is that purchasing spend should be concentrated on fewer suppliers to increase Procurement's negotiating leverage and reduce transaction costs. While some report that rationalisation has resulted in "tremendous" *[Procurement Director 29th Nov 07]* cost reductions, others see these efforts as a tactical response to the need to control costs *[Supply Chain Development Manager 29th Nov. 07]* and argue that it is

"not just a case of trimming out dead wood, it is a case of changing the way we buy things, changing our strategy" *[Procurement Marketing Manager 26th Nov. 07]*. Manufacturing opportunities in low cost economies have been considered, "we know instinctively that there is some opportunity out there […] we have got people who have popped up to China and looked at this" *[Key Supplier Account Manager 13th Nov. 07]*. The company has, for example, investigated whether it could manufacture its wiring looms in "lower cost economies because the hourly rates here [in the UK] are so high" *[Head of Programme 13th Nov. 07]*. However, it is the meeting of offset obligations rather than the consideration of low cost economies per se that "drives a significant amount" *[Head of Procurement Operations 26th Nov. 07]* of decisions to source overseas. When a helicopter order is secured in a country "follow-on procurement activity has taken place as a result of us having an offset obligation and they continue to this day" *[Head of Industrial Participation 5th Nov. 07]*. In fact, Procurement rarely considers changing the source of items unless "as a result of offset or as a result of cost" *[Head of Procurement Operations 26th Nov. 07]*.

The appointment of Key Supplier Account Managers three years previously was Case B's recognition of the need to "manage [the] supplier relationship" *[Business Unit Director 5th Nov. 07]* rather than focus exclusively on cost. Account managers would "have a view across the organisation" *[ibid.]* that would address the "different dynamics" *[ibid.]* between suppliers, the functions and the Programme Teams, ensuring that "everything is discussed in the appropriate manner at the right time" *[Supply Chain Development Manager 29th Nov. 07]*. In practice, however, there are reservations about whether the Account Manager role has proven to have strategic significance or if it is just a "tactic that enables us to manage our relationships a little better" *[ibid]*. A view persists that "we do not look or plan in any great depth how we are going to develop and work with our strategic suppliers" *[Procurement Manager 5th Nov. 07]*. For example, Case B does try to flow risk down to their supply base "when appropriate, through terms and conditions" *[Head of Procurement Contracts 13th Nov. 07]* but these attempts are "not that sophisticated" *[Head of Procurement Development 14th Aug. 07]*. Despite the presence of Account Managers, supply decisions are still optimised programme-by-programme and are not taken from a "strategic viewpoint across helicopter platforms […] I don't think we're so good at forming partnerships with companies" *[Head of Programme 13th Nov. 07]*.

Where good examples of supplier relationship development are reported it is believed that they are "driven out of individual preferences rather than an underlying, on-going, strong business need" *[Head of Procurement Contracts 13th Nov. 07]*. In any case, it is also reported that engaging many suppliers in long-term relationship development processes is problematic when Case B's requirements can often be small and/or irregular. "We only want four, or we

only want six, so what supplier in his right mind...?" *[Head of Procurement Operations 26th Nov. 07]*. Management of the supplier relationship is also impaired by the separation of Procurement and Operations' responsibilities. Once a contract is negotiated and a purchase order is placed with a supplier by Procurement, Operations manage getting the goods in at "the right time, at the right quality" *[Procurement Marketing Manager 26th Nov. 07]*. Operations are, however, also concerned with the on-going performance of the supplier in a way that Procurement or the relevant Programme Team are not once the supplier has been selected *[Supply Chain Development Manager 29th Nov. 07]*. Operations consequently engage in performance development with suppliers, yet because of the functional separation between Operations and Procurement, supplier selection and supplier development are often disconnected. Consequently, Procurement "de-select suppliers that [Operations] have spent 12 months developing" *[ibid.]* and vice versa, Procurement contract with suppliers whom Operations have previously deemed unsuitable.

The scope of Case B's supply strategy is therefore principally constrained to five topics: cost reduction, supply base reduction, commodity strategy, overseas sourcing in low cost economies or to fulfil offset obligations, and supplier relationship / performance development. Given the company's reluctance to reveal its details even within the business, it is unsurprising that actors are also unable to identify how the supply strategy interfaces with the top level business strategy. Some respondents are unclear about the company's direction and why they "cannot get to a commercially clear standpoint of what we need to do as a business" *[Procurement Manager 5th Nov. 07]* or clarify "the picture we are trying to convey going forward" *[Head of Programme 13th Nov. 07]*. Other respondents perceive a strategic direction in the business, but are unable to identify how supply strategy fits with it. "We have a vision, we have a mission statement, but how that is then rationalised as a procurement [supply] strategy, there's no clear link" *[Procurement Marketing Manager 26th Nov. 07]*. Describing the link between the business strategy and supply strategy as "fractured" *[Supply Chain Development Manager 29th Nov. 07]*, one respondent explained that "there doesn't feel like there is a connection between a corporate vision which says this is what we are going to do and this is how we are going to execute it within Manufacturing or Operations, and then out in the supply chain" *[ibid.]*.

In summary, to some actors Case B's supply activities and practices amount to no more than a "tactical approach" *[Head of Procurement Contracts 13th Nov. 07]* to supply; one decision following another without "a constant message" *[Head of Programme 13th Nov. 07]*. Others perceive a pattern that may be discerned as supply strategy, even if the resulting strategy is only an "after effect of the front end [Sales, Marketing, Engineering] decision making

process" *[Key Supplier Account Manager 13th Nov. 07]* or just the "unpicking of supply tactics of 30 years" *[Supply Chain Development Manager 29th Nov. 07]* re-branded as supply strategy. Others perceive pro-activity and calculated action in supply practices and decisions but acknowledge, "actually joining them all together into a very clear supply strategy is the bit that is not quite so well published or communicated" *[Procurement Marketing Manager 26th Nov. 07]*.

4.3 Research Case 'C'

Case C's parent company is a manufacturing enterprise with global interests in the Aerospace and Transportation sectors.[22] Founded in the 1940's producing snowmobiles and subsequently personal watercraft, the company began manufacturing railway rolling stock in the 1970's. In 1986 they entered the aerospace sector with the acquisition of an aircraft manufacturer in North America. Three years later they acquired a British aerospace company from the UK Government, followed by two further North American aerospace acquisitions in 1990 and 1992 respectively. Today, the company is one of the world's three largest civil aircraft producers with aerospace accounting for 56 percent of the company's total revenues in 2007. The company's product portfolio consists of mainly business and regional aircraft and they are the leader in every regional jet market segment in which they compete. The company also produces aircraft for specialist applications such as VIP, medical evacuation and search and rescue roles, as well as amphibious aircraft with multi-mission capability.

This case study focuses on the company's UK manufacturing facility (Case C) and is based on 18 interviews with company executives and two suppliers, conducted between October 2007 and February 2008. Case C's activities are distributed across four closely situated locations: a main manufacturing site, two composite fabrication and assembly sites and a metal fabrication site. The parent company has invested U$2bn in these facilities since they were acquired in 1989. Case C is run as a semi-autonomous business within the parent company, under the direction of a Vice-President / General Manager and a Leadership Team (see overleaf). The parent company has three corporate strategic objectives and Case C's Leadership Team has added two others, making five objectives for the UK facility. Collectively these are known by the acronym GOALS:

- **G**ive an amazing customer experience
- **O**ptimise business performance by eliminating waste
- **A**dvance to higher value products and services *(Case C specific)*
- **L**everage new business *(Case C specific)*
- **S**uccessfully transform the environment to create a safe & rewarding workplace

[22] Quoted on a North American stock exchange, the group's revenue for the financial year ending in 2007 was U$14bn. 45 percent of revenues were generated in Europe, 36 percent in North America and 19 percent in Asia-Pacific and other regions. The company has 56,000 employees worldwide.

With over 5,000 employees, Case C is the largest private sector employer in their economic region. 95 percent of the workforce is unionised. The average employee is 44 years of age and has 11 years of service *[VP Human Resources 13th Feb 08]*.

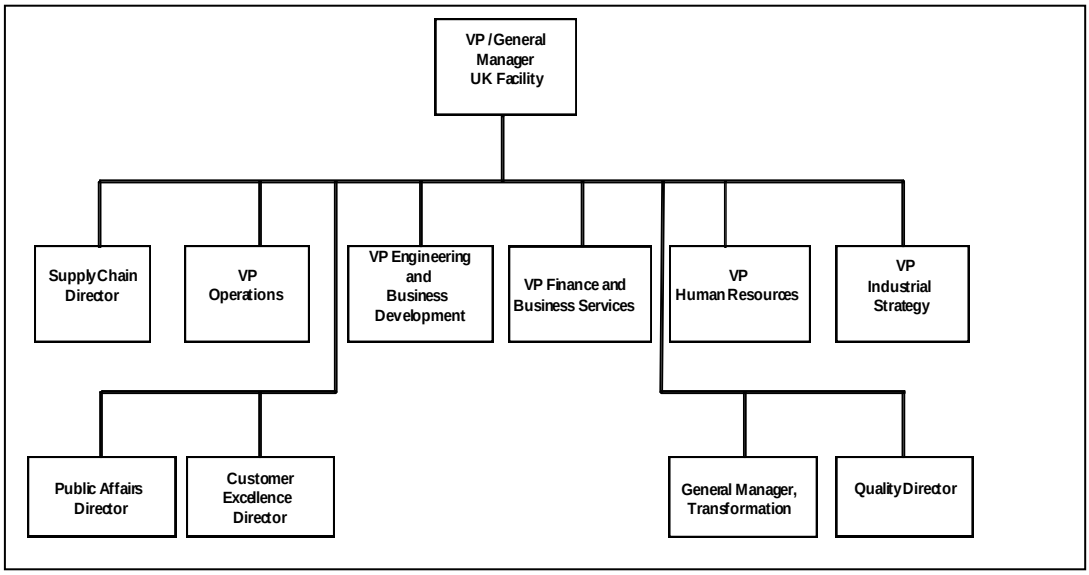

Figure 11. Case C's Leadership Team (simplified)

Supply management

Case C manufactures the fuselages for 12 of the parent company's aircraft portfolio as well as various empennages and nacelles.[23] On completion these are shipped to North America for final assembly. Additionally, Case C oversees the manufacture of an aircraft fuselage in China as part of a strategic joint venture between the parent company and a Chinese aircraft corporation (CAC). This involves programme managers travelling from the UK to China to develop the CAC's production capability. The fuselage is currently being dual sourced to mitigate risk while the relationship with the CAC and their manufacturing processes are developed. The decision to proceed with the joint venture and manage it from the UK was made by the parent company in North America, after the previous manufacturer of the fuselage could not continue with the contract. Generally, however, Case C's Leadership Team is required to secure the allocation of new work to the UK facility in competition with other parent company sites and external providers. The corporate management team manages this business case justification process. In addition to production for its parent company, Case C also manufactures empennages and nacelles for external customers. Approximately 30 percent *[VP Finance 11th Feb 08]* of Case C's annual turnover of more than U$600m is derived from external customers *[Supply Chain Quality Manager 31st Oct 07]*.

[23] An empennage is the tail section of an aircraft. A nacelle is a combined engine housing, thrust reverser and exhaust nozzle, usually attached to the wing of an aircraft.

Reporting to the General Manager, the Supply Chain Director manages over 500 suppliers and 38,000 live part numbers *[Supply Chain Quality Manager 31st Oct 07]*, although in the region of 50 suppliers account for approximately 80 percent of the overall spend *[Supply Chain Director 31st Oct 07]*. Case C's annual procurement budget is U$400m to U$500m *[Supply Chain Quality Manager 31st Oct 07]*, or roughly 70 percent of its annual turnover. Approximately U$160m (£100m) of this budget is spent in the UK; most overseas suppliers are located in North America and a minority in mainland Europe *[ibid.]*. The main commodity groups purchased are metal, composite materials, machined components, sheet metal components, composite components, sub-assemblies and fixings *[ibid. 31st Oct 07]*. The Supply Chain function is divided into two teams *[ibid. 31st Oct 07]*. The first team ('sourcing') is charged with negotiating terms, conditions and pricing with suppliers, and obtaining parts for first article supply. With the aim of realising economies of scale in negotiations, these activities are organised into specialisms of new business, work transfer, non-product and 'technicals' (i.e. metals and composite materials) *[Sourcing Manager 4th Feb 08]*. The second team ('material logistics') is responsible for placing purchases orders, managing material logistics and overseeing the on-going relationship with suppliers.

Case C does not have a written supply strategy and does not have a prescribed process to formulate supply strategy. One executive commented, "I would be amazed if you heard anybody saying we've got a real supply strategy here. We've got things we're doing, no doubt about it, and we've good things we're doing, but to say it's thought through would be a real stretch, I mean a real stretch" *[VP and General Manager 5th Feb 08]*. Nonetheless, actors comprehend supply strategy as emerging from connected streams of supply decisions and activities. "We do not have a strategy written down. […] A lot of our sourcing methodology comes from group standard order plates, standard RFP forms, we get recommendations for offset and low cost economies, so we have different elements that you could call a strategy. You know, commodity reviews and things that we look to for reducing costs and improving relationships, but there's no one piece of paper with a pyramid strategy on it" *[Supply Chain Director 31st Oct 07]*. In other words, in the absence of a process to formulate supply strategy through explicit design, Case C's supply strategy coalesces from a complex mix of supply decisions made by diverse actors representing internal business functions, the Leadership Team and the parent company.

Supply strategy process

The sequence of supply decisions begins when Case C has been awarded a package of work by the parent company, for example to manufacture elements of a new regional aircraft, or on securing an external order for empennages and/or nacelles. At the beginning of each new programme, decisions are made concerning what will be manufactured in-house and what will be purchased *[Sourcing Manager 4th Feb 08]*. The make versus buy protocol is primarily decided by the Operations (i.e. manufacturing) and Engineering functions, albeit with input from the Supply Chain function. "It used to be […] they just dictated […] but I pushed back strongly. […] We (supply chain) are not a dumping ground, we need to be very structured in the type of work we put out and the type of work we should be making here. So, I've been forcing them to develop their own manufacturing strategy […] so when a new programme comes it's very clear" *[Supply Chain Director 31st Oct 07]*. However, the perception persists that Operations and Engineering nevertheless "pick the easy stuff" *[Supply Chain Director 12th Feb 08]* to manufacture in-house. "We should have a manufacturing strategy that we should always be making certain types of components or dual sourcing […] and from that comes a very clear make or buy policy, […] but at the minute we still haven't defined what our manufacturing strategy is" *[ibid.]*. One executive commented that, "One of our biggest challenges here is that we don't like thinking about […] the supporting strategies; HR, Finance, Supply Chain, Manufacturing, or whatever" *[VP and General Manager 5th Feb 08]*. Consequently, actors in the Supply Chain function perceive that if Operations do not have "enough capacity or have parts they wish to offload, they will drive that to us. […] We will not be able to turn around and say that capability is better to remain in-house because the supply base doesn't have the capability to do it. […] That's not the type of conversation that takes place. It's driven to us as opposed to an agreement of what goes out for the best of the organisation" *[Chief Buyer 6th Feb 08]*.

The contrary perspective is that Case C has made a significant investment in manufacturing facilities. Consequently, Operations and Engineering form the make versus buy decision on the principle of attempting to optimise the utilisation of these assets. "We've just spent £4m on these nice new machines and we've got to put some work on them" *[Sourcing Manager 4th Feb 08]*. "If you invest in a £6m or £8m piece of kit, you want to maintain a certain level (of manufacturing throughput), as long as that level is giving you a cost […] which is at least equal to what you were getting on the external market (i.e. if the part was bought in)" *[VP Finance 11th Feb 08]*. Likewise, Case C is committed to maintaining full employment for their 5,000 employees, avoiding redundancies but not growing the workforce either. "The model we want to achieve is to […] improve productivity and not bring more people on board" *[VP Human Resources 13th Feb 08]*. Therefore, when running at optimum utilisation, the make versus

buy decision "[…] will be based more around capacity. It's a case of […] we're busy on our own work at the moment" *[Sourcing Manager 4th Feb 08]* so the Supply Chain function is instructed to purchase the item instead. "Nine out of ten times it has to happen (i.e. items must be bought in rather than made in-house) because the business can't support doing it internally" *[Chief Buyer 6th Feb 08]*. Consequently, "What usually happens is that it goes over to the manufacturing engineer responsible for that sector. […] They look at the drawings and models of the new parts and make an assessment whether or not they can make those bits, produce them at the right price and quality. If he passes that test, he would talk to the Operations people to ask if he's got capacity. […] If we're honest, it (the make or buy decision) probably takes place at too low a level; those people take the decisions. […] We probably give them an easy ride in allowing them to pick and choose which parts they want to make and what their capacity load should be. Then, the rest we dump onto (the Supply Chain function) and let them get on with it. So it's not terribly sensitive" *[VP Engineering 11th Feb 08]*.

One consequence of this process is that low added value manufacturing work can be retained in-house, while higher value manufacturing is outsourced to external providers, because Operations can more easily accommodate the lower value work. "They want to pay millions for this high value work to go to sub-contractors and we are making this rubbish in here" *[Sourcing Manager 7th Feb 08]*. A respondent explained that such decisions are sometimes necessary to meet commercial objectives. "It would be a collective effort of Engineering, Methods (i.e. Operations), primarily at the front end along with the estimators saying, the only way we can hit the target price we've been fed is by offloading two out of the four components […] to give an overall package that works" *[VP Finance 11th Feb 08]*. Nonetheless, from the perspective of actors within the Supply Chain function, such decisions can appear counter-intuitive and "The problem with that is you're just being told go and do it" *[Chief Buyer 6th Feb 08]*. One respondent observed that, "I know there are various things that drive that. In times of downturn we need to protect 50 jobs or whatever, I've no issue with that at all. I have an issue with […] how our massive organisation, with a massive overhead could make it for less than (a specialist / low cost supplier). I don't believe it and I don't believe that it's the right business decision" *[Sourcing Manager 4th Feb 08]*. Furthermore, a decision to purchase a part from a supplier can also be rescinded subsequently by Operations, as circumstances change. Items that have been assigned for external manufacture are sometimes brought back in-house if Operations has spare manufacturing capacity. "I may have signed a supply contract for those parts, […] and then all of a sudden I (must) take three quarters of the (order volume) away (from the supplier). […] That, I think, causes a lot of frustration in make-buy and what we are really trying to achieve" *[ibid.]*.

And yet, patterns in decisions can be perceived that also illustrate a consistency of approach to make versus buy decisions. One respondent explained, "We only do a very small percentage of the total machining requirements, it's only the larger machining because […] you can get the small machining anywhere (externally)" *[General Manager 6th Feb 08]*. In fact, a study five years ago concluded that machining was "not critical to the items in-house and if you (retain 15 percent of machining in-house), you know enough about true cost to allow you to determine what is good value (from external suppliers)" *[VP Finance 11th Feb 08]*. "The same thing with sheet metal […] we found that the type of people who do sheet metal tend to be lower capability organisations" *[General Manager 6th Feb 08]*, so a sheet metal capability is retained in-house. However, the in-house capability is now fully utilised and any additional future requirements often need to be bought in, "because we're maxed out and in a sense it's a strategy, but it's the result of saying we've decided not to invest in any more (sheet metal capability) and by the way, a new (sheet metal) press is 18 month's lead time so you'd be forced into having to offload for a period of time anyway" *[VP Finance 11th Feb 08]*. Similarly, although respondents highlight the influential role of actors within Engineering and Operations in the make versus buy decision, there is evidently also a measure of necessary co-operation between functions in operationalising the decision. Operations "can't do an offload on their own, […] it necessarily involves the whole team in any of those significant areas (i.e. Engineering, Tooling, Operations, Supply Chain). […] (Likewise, if) Supply Chain takes a supplier from X to Y (they) still require (assistance from) Operations or Engineering because of the qualification requirements, so it's a difficult thing to do in isolation. You invariably involve the whole team in the development of the strategy" *[ibid.]*.

Case C's Leadership Team[24] also play a role in the development of supply strategy in two significant ways. First, by design and practice some supply decisions are referred by lower level managers to the Leadership Team for approval. A respondent explained, "If I negotiate a contract with a supplier and it's for a value of £30,000 a year (or more), it has to go to Vice-President level to be approved. […] They have put this hierarchy in that has just overtaken processes" *[Chief Buyer 6th Feb 08]*. Likewise, disagreements between functions concerning supply decisions are also escalated to the Leadership Team. "Regrettably, some go to (the General Manager) which I think is a sad indictment on all of us. It tends to go up very quickly because we don't have a good infrastructure to debate the issues and jointly agree the best business decision" *[Sourcing Manager 4th Feb 08]*. The second Leadership Team

[24] Case C's full Leadership Team has a membership of 15 directors / vice-presidents and meets every month. A smaller Strategy Board, consisting of a sub-set of the Leadership Team including the Supply Chain Director, meets weekly to facilitate timely decision-making *[VP Engineering 11th February 08]*.

intervention is their instigation of an Industrial Strategy.[25] Directed by the Vice-President who also has responsibility for Case C's collaboration with CAC, the Industrial Strategy directly addresses Case C's objectives to advance to higher value products / services and leverage new business. "Fundamentally, we decided we wanted to be in higher value products and services. […] What it meant was we needed to create a niche for ourselves and that niche had got to be at the high end of the market, with the high technology part of engineering and it needed to target where we believed our core competencies lay" *[VP Industrial Strategy 12th Feb 08]*. Specifically, this process identified the manufacture of nacelles and wings using composite materials, in-house design rather than merely a build to print capability, the preparedness to enter into risk-sharing agreements with other aerospace manufacturers and the further development of the off-shore manufacturing relationship with CAC as Case C's key industrial objectives.[26] In practice, over the last two years the Industrial Strategy steering committee has formed (this includes the Director of Supply Chain), and some cross-functional project teams have been established. "We set up two elements, one is the new business team and we took some of our best people out of their current jobs and actually put them in the new business team. We also set up the industrial engineering team, which is probably under-resourced for what we need to do, but nonetheless we established some critical key performance indicators within that process" *[VP Industrial Strategy 12th February 08]*.

These indicators are primarily directed at manufacturing capacity. For example, "value per employee, value per square foot, the severity; is it difficult to move, is it easy?" *[Supply Chain Director 12th Feb 08]*. "At this point in time the big driver for the organisation is floor space, so typically what's happened is that the guys are looking at […] what can we move easily with low levels of support once it's out there, which will give us lots of floor space (so higher value work can be introduced)" *[Sourcing Manager 4th Feb 08]*. One executive concurred, "At the moment we are only trying to establish an offload strategy, […] so we're nowhere near getting a fully integrated plan, […] and I wouldn't tell you anything different" *[VP Industrial Strategy 12th February 08]*. Consequently, while the Industrial Strategy team is currently engaged in identifying current manufacturing that may be outsourced in the future, they have yet to address what new business to attract. "Maybe we're being unfair, […] it's good to have

[25] The Leadership Team employed a firm of management consultants to facilitate the process of developing an Industrial Strategy that would dovetail with the parent company's strategic objectives and differentiate Case C from their competitors [VP Industrial Strategy 12th Feb 08].

[26] In tandem, the Case C Leadership Team also put in place a 'transformation' programme aimed at improving the skills of the workforce in Operations and developing Lean manufacturing processes. The introduction of Lean addresses another Case C strategic objective, to optimise business performance by eliminating waste. As the two programmes run in parallel, it is acknowledged that the 'transformation' programme could invest in introducing Lean to manufacturing processes that may be subsequently outsourced or replaced as a consequence of the Industrial Strategy [Supply Chain Director 12th Feb 08].

quantifiable data, that instead of making gut feel judgments you're arguing with data, but now […] we need to turn to what should we be making on this site. […] They (Business Development) are going around the world looking for new business. So what are they looking for, more of the same? So, it's got to be joined up a bit" *[Supply Chain Director 12th Feb 08]*. Nonetheless, the emerging Industrial Strategy and the Leadership Team are prominently engaged in the further definition of Case C's make versus buy protocol although, "this at the moment is in its infancy. You need to be aware of that" *[Sourcing Manager 4th Feb 08]*.

Case C's parent company has an overall influence on supply decisions. As 70 percent of Case C's manufacturing output is destined for their parent company, there is a continual debate within Case C's Leadership Team about the extent of their strategic autonomy. "We've quite a few […] heated discussions on strategy in general. There's always a tension between how much in control are we here? Obviously, (we're) a wholly owned subsidiary, there's a head office and a shareholder to satisfy […] and the product strategy is driven out of (the North American head office) *[VP and General Manager 5th Feb 08]*. As both principle customer and parent, the North American head office is therefore a major driver of supply decisions. "We get mandates down, for example to support and develop (supply in) a low cost country. […] Two or three years ago (the parent company's VP of Supply Chain & team) visited a lot of companies across the world, Mexico, Russia, China, Taiwan and the selection criteria came up with CAC. […] So we have identified packages, taken them out of Japan and put them into China" *[Supply Chain Director 31st Oct 07]*. That decision, "[…] was a fait accompli almost, it was a case of this supplier has been selected, don't question it. This is the work that they are going to be doing and the (Case C) team is going to be responsible for. […] Pretty much a case of this is what we're going to do and make it work" *[Supply Chain Quality Manager 31st Oct 07]*.

When required, Case C also aligns its supply chain to support the parent company's sales activities. "You've always got to remember that (Case C) is a supplier to (the parent company), […] we don't do final aircraft here, […] they sell aeroplanes" *[ibid.]*. This can involve Case C being asked to switch supply to a country to support the parent company in pursuit of an order, or to assist in fulfilling an offset obligation incurred by the parent. For example, "The sales people come and say look, this Government, they want to buy a business jet. We amongst others are bidding. So okay, let's see if we can't move some (procurement) into (that country)" *[Sourcing Manager 7th Feb 08]*. Similarly, "You get the pressure of offset. We have to give business to (a country) and not only for aerospace. When (other parent company divisions incur an offset obligation) any offset counts, so if we can put the manufacture of an aircraft part into a country that is about to purchase trains, then we

have to do that" *[Supply Chain Director 12th Feb 08]*. In discussions about any significant realignment of supply, Case C's VP / General Manager would represent the Leadership Team in negotiations with the parent company. For instance, "We have taken some work out of here and put it into Mexico […] and he would have been part of those discussions" *[Supply Chain Director 31st Oct 07]*.

The parent company's corporate commodity strategies are also associated with the development of low cost economy suppliers. There are approximately 30 commodity teams developing corporate strategy for commodities ranging from raw materials, to aircraft interiors and electronic management systems *[Sourcing Manager 7th Feb 08]*. "The biggest thing that is driving the sourcing strategy (at the parent's North American HQ) will be the commodity strategy and starting to bring on board lower cost countries" *[Supply Chain Director 31st October 07]*. The majority of the commodity teams are run out of the North American HQ *[ibid.]* and represent centrally agreed supply contracts that Case C subsequently adhere to. Examples include their provider of third party logistics *[Sourcing Manager 4th Feb 08]* and their aluminium supplier. "Aluminium would be 80 percent of the raw material we use here and yet we have no control over its price; it's all negotiated at a group level" *[VP and General Manager 5th Feb 08]*. One respondent recalled being informed that the corporate commodity team with responsibility for aluminium had agreed a contract with "the largest aluminium producing company in the world, not just for aerospace (but across all sectors of the parent company), […] and part of the deal was they would get 100 percent of (Case C's) business, (even though) we had other deals with European mills at lower prices. […]" *[Sourcing Manager 7th Feb 08]*.

Because of the corporate focus on commodities, Case C's Supply Chain function is organised with specialists aligned to various commodity groups. "We've set ourselves up by commodities. So we've got a department advisor on materials, aircraft structures, detailed parts, hardware […] and we take the lead for all (the parent company) on composite raw material and detailed parts. […] We take a strategic initiative on that. We lead it for the group, all the purchasing power for the group. We deal with engineering looking at new technology, new designs, new materials, to help improve the product and reduce costs" *[Supply Chain Director 31st Oct 07]*. The parent company's designation of Case C as the corporate centre of excellence for composite manufacture "wasn't a fluke" *[VP Industrial Strategy 12th Feb 08]* but "was almost preordained by some of the work that we had done and more

importantly, by some of the programmes we were involved in and thirdly, because of the technologies that were involved in some of that new work" [ibid.].[27]

In summary, Case C's supply strategy coalesces from a composite of supply decisions taken by various actors within the Engineering, Operations and Supply Chain functions, the Leadership Team, the Industrial Strategy teams, corporate commodity teams and the parent company. The following figure – Figure 12 - illustrates the interaction between these actors and the 'nature' of those interactions – e.g. the central role played by the Leadership Team. The figure also seeks to highlight where / how key strategic supply decisions – such as the make-buy decision are made within Case C.

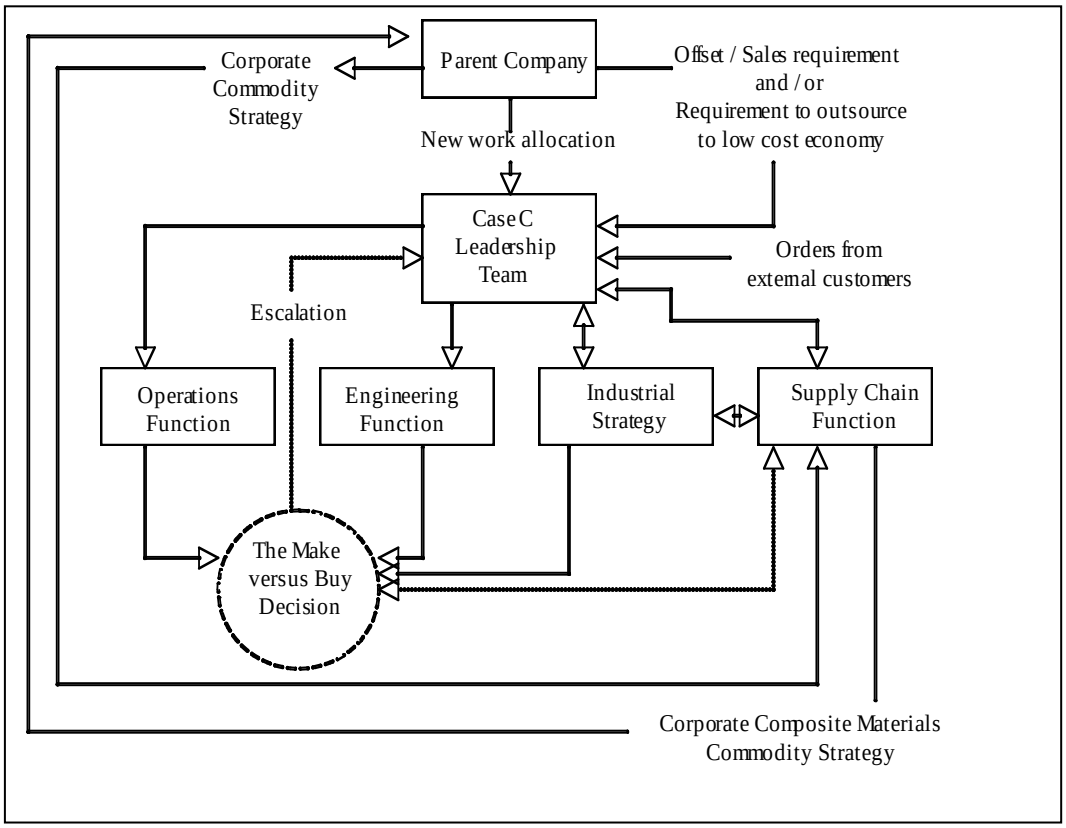

Figure 12. Case 'C' supply strategy process

In addition to these main processes, Case C also operates miscellaneous project teams and practices. For example, "we've got a Project 500 workshop, which is really a cross-functional team. […] The name Project 500 came from our need to (corporately) take $500m

[27] In point of fact, through their acquisition of the businesses that form Case C the parent company had acquired two factories with established composite material manufacturing capabilities; one in the aerospace sector and the other originally in the automotive sector.

out of our spend, so Project 500 takes deep dives into everything that we make here and buy, looking for opportunities to take cost out" *[Supply Chain Director 31st October 07]*. Furthermore, "we have developed a process called SOFE, where Sourcing Operations, Finance and Engineering go into a company (i.e. a supplier) and do a very deep dive. We say at the end of it we want to give a third of the savings to our customer, a third to the supplier and a third to us. Any opportunities we identify that's how we split it, so it's very much a win-win" *[ibid.]*. Some generic and externally derived management concepts are familiar within the Supply Chain function, especially environmental scanning utilising SWOT analysis *[Chief Buyer 6th Feb 08]* and the Balanced Scorecard approach to operationalising business strategy (Kaplan and Norton, 1996). "Cost is bottom of the pile. You get your health and safety right, you get your quality right, get your performance right, you get your people; everything else should come" *[Supply Chain Director 12th Feb 08]*. However, such an approach is at odds with Case C's established ethos. "It's a huge issue […] even for (the VP / General Manager) in many respects. He likes to run a tight ship here, signs everything off and they don't want to lose control of that" *[ibid.]*. Of greater day-to-day influence, therefore, is an in-house developed sourcing scorecard. "Supplier evaluation analysis is critical to what we do because you can't have a subjective viewpoint about a supplier. […] We have our own vendor analysis tools […] which measure all issues of performance: cost, performance, flexibility" *[Chief Buyer 6th February 08]*. "We say here are the packages we want to put out. We then use that to drive our scorecard and the numbers are crunched. […] It's very regimented and data driven" *[Sourcing Manager 4th February 08]*. To illustrate, the scorecard was used to evaluate second sources of supply for fuselage doors. "We came up with a weighted scorecard. We rated that cost wasn't the primary driver; it was schedule capability. Then for a low-cost country, (we) looked at the total transport costs, the costs of people being in there to manage it. The companies were selected based on the score they got" *[Supply Chain Director 12th February 08]*.

Taken as a whole, Case C's supply strategy is the product of both formal and emergent processes. On one side of the equation is the instability and continual re-adjustment associated with attempting to maximise the utilisation of machinery and the workforce in the make versus buy decision, while simultaneously accommodating the parent company's directives on outsourcing and offset. Case C attempts to counter-balance these forces by introducing stability in the form of consistent practices (e.g. toward machining and sheet metal), commodity strategies, the embryonic Industrial Strategy, tight management control via the Leadership Team, miscellaneous projects and practices such as the Sourcing Scorecard. Some of these are premeditated actions, such as the instigation of the Industrial Strategy, while others such as consistent practices are themselves emergent.

The scope of supply strategy

At the heart of Case C's supply philosophy is adherence to the manufacturing schedule. "It's one thing that (our parent company) taught us. […] If you are going to deliver a part to them, you'd better deliver because you've committed to it. So very much, that's the ethos" *[Supply Chain Director 31st October 07]*. A key principle for the Supply Chain function is, therefore, to "get rid of shortages. […] Not what parts of the world are they making this, is it a stable currency? Nothing broad brush, just literally get rid of shortages and then get costs down" *[Sourcing Manager 7th February 08]*. The pursuit of cost reduction is manifest in many of the day-to-day decisions that formulate Case C's supply strategy. "Our strategy for procurement is lowest cost; think of now, think of today. What can you get out of suppliers? Tie them in to a tight contract. It's been very focussed on cost […] and we're seeing it because in some cases where we are driving down cost in the bill of materials, we don't necessarily get the quality" *[General Manager 6th February 08]*. One actor concurred, "The day-to-day activities of buyers, the sourcing agents, myself, are to identify methods of achieving cost reduction. […] Maintaining contracts with suppliers and cost reduction strategies" *[Chief Buyer 6th February 08]*. Within this remit, actors within the function are empowered to make their own decisions. "I mean, cost reduction. (The Supply Chain Director) will not be prescriptive and say 'go do one, two and three'. I'm given the latitude of doing it. […] It's really understanding the rule that I have to ensure that if we have the opportunity to get a lower cost, better price or whatever from an approved supplier, that we look at that because we understand that it's our core task" *[Sourcing Manager 4th February 08]*. The weight Case C and its parent company accord to commodity strategies is also a manifestation of a cost centred approach to supply strategy. "That has proved to be a very good strategy. To put all your purchasing requirements together and go out with a much bigger shopping list and therefore, in the main you will attract much bigger discounts and have more clout within the supply chain" *[Sourcing Manager 7th February 08]*. Likewise, the parent company's focus on sourcing from low cost economies is chiefly cost focussed, although commercial opportunities and offset obligations also propel this activity. "The biggest thing driving the sourcing strategy in (the parent company) is the commodity strategy and starting to bring on board lower cost countries" *[Supply Chain Director 31st October 07]*.

As with cost reduction, seeking opportunities to reduce the supply base is perceived to be a core activity for the Supply Chain function. "The business is very much driven by reducing costs, reducing the number of performing suppliers, rationalising the supply base where we can" *[Supply Chain Director 31st October 07]*. Supplier development is also evident. "We have started to look at a supplier development programme again, picking strategically significant suppliers and starting a programme with them that will show our commitment to them. […]

We used to do that. […] 12 or 15 years ago we had people dedicated to supplier development" *[Chief Buyer 6th February 08]*. Such a programme is seen as operationally necessary. "If you ask for 5 percent (cost reduction, the supplier will say) 'I can't do it I'm going to go bust. Well, how are you going to help them do it? So, there's developing a relationship, sharing best practice, re-engineering the process for them, deliveries, implementing MRP in their system which we've done with some major suppliers" *[Supply Chain Director 31st October 07]*. Nonetheless, in most instances Case C's relationship with its supply base is primarily transactional. "The only time we've seen suppliers here is whenever we've asked them to come in and present a recovery plan, or we're getting to the stage of a hard point in the commercial negotiations. I would have to say that in my almost 29 years I have never been to a good (supplier) company" *[Sourcing Manager 4th February 08]*.

The scope of Case C's supply strategy is consequently principally limited to five topics: schedule adherence, cost reduction, commodity strategy, low cost economy sourcing and supplier relationship development / performance improvement. While the parent company's influence is felt only distantly in the day-to-day running of Case C's operations, "they very much leave it to us, they have given us an open book" *[Supply Chain Director 12th February 08]*, the scope of Case C's supply strategy is influenced by both the parent company (i.e. corporate commodity strategy; offset requirements) and the manufacturing / engineering focus of Case C's Leadership Team. The significance of these influences is recognised within the business. "70 percent of what we make and send out the door to our customer is bought in. That is a hugely significant portion of everything that goes out the door, but at times I feel that the 30 percent drives the 70 percent, which I think is the wrong way around. […] If it is our strategy to buy in more than we make then the buy-in strategy is as significant, if not more significant, than our operational (manufacturing) strategy" *[Chief Buyer 6th February 08]*. Nonetheless, the Supply Chain function is not generally perceived to play a strategically important role. "As far as Operations are concerned, all they want to see is bits in the hand of the operator. […] The way (the Supply Chain function) would be looked at, certainly by Operations, is as a provider of the bits when they need them. […] Operations are where the vast majority of this organisation is engaged day-to-day. Keeping the wheels turning. The (Supply Chain function) is seen as an operational function. It's a function there to get bits in" *[General Manager 6th February 08]*.

Within the Leadership Team itself the need for change is acknowledged. "We will have to move quite significantly from where our Supply Chain organisation is today, into a different type of organisation. […] We will have to change it to an organisation that is adding value as opposed to doing the donkey-work, like the logistics, like the storing, like the delivery to the

line. […] If supply is going to be 50 percent of our unit cost going forward, and maybe more as we change the make-buy and we move up the value chain, how do we do it better than we've done before? […] We're perceived as pretty tough negotiators of price but we leave an awful lot of money on the table, because there are things we could do to help (suppliers) take cost out that we're incapable or unwilling to do. […] We still think we're the big prime (customer) and those guys are SME's (i.e. small / medium enterprises), you know" *[VP and General Manager 5th Feb 08]*. However, the change process when it begins will most likely be evolutionary rather than revolutionary. "I think they (the Leadership Team) are old school, probably still set in their ways. […] Rather than saying let's do that, (the General Manager) has to manage the change. It's not an easy position" *[Supply Chain Director 12th February 08]*.

4.4 Research Case 'D'

Case D is a UK based manufacturer, originally established over 50 years ago and now engaged in the production of electrical power systems for large commercial aircraft, military aircraft, business jets and helicopters. Their product range covers main engine and auxiliary generators including variable frequency ac power generation, control units and primary / secondary electrical distribution systems. A typical generator sells for £10k to £15k although a generator for a light aircraft generator is typically about U$2k. Case D supplies systems to defence and civil customers around the globe and provides aftermarket maintenance, repair and overhaul (MRO) support. In October 2002 the company became a subsidiary within the Electronics Systems segment of a North American multi-national group that provides systems and services to the aerospace and defence industries.[28]

This case study is based on 14 interviews conducted with Case D managers and executives, including four directors and the Vice-President (VP) with responsibility for the company's European operations. Case D has approximately 550 unionised employees based at one UK site and an additional design facility in the USA. The company's turnover is around £100m per year of which 70 percent is derived from the civilian sector and 30 percent from the military sector. Twenty years ago the military would have accounted for 70 percent of the company's revenue. Roughly 55 percent of Case D's total revenue is generated by MRO activities and these are proportionally more profitable than the manufacture of new products. A rival company controlling approximately 70 percent of the total market dominates the aircraft electrical power systems market. Case D's market share is in the region of 20 percent. However, these two companies have a symbiotic relationship, each having previously manufactured some of the other's parts under license. In the past, the rival company has also off loaded some of their business to Case D to free up manufacturing capacity.

The Company's senior management team consists of a President and the vice-presidents of Finance & Administration, Systems, Engineering & Quality, Business Development, Operations & Supply Chain, Programmes Engineering and Human Resources (see figure overleaf).

[28] The group is a Fortune 500 company quoted on a US stock exchange. Revenue for 2008 was U$ 7,062m. The company has over 23,000 employees in 100 facilities around the world.

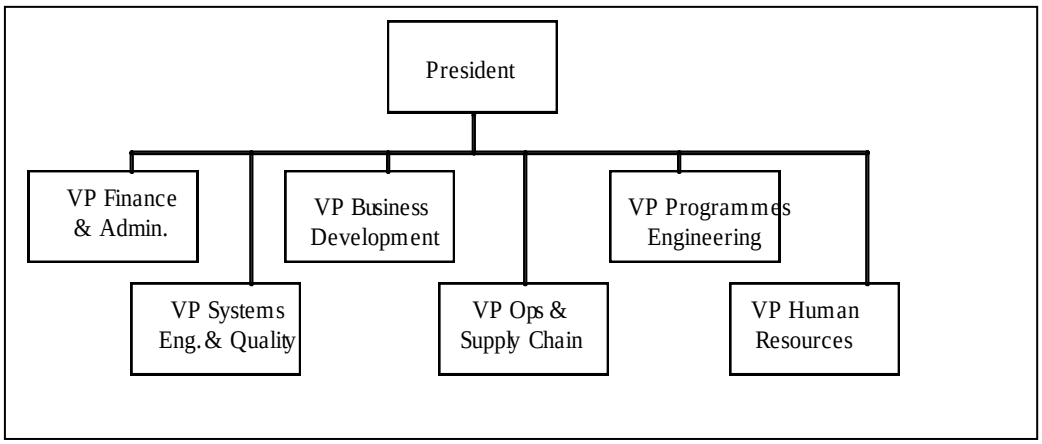

Figure 13. Case D's Senior Management Team

Supply management

Reporting to the VP of Operations and Supply Chain (VPO&SC) are four Operations Managers, a Supply Chain Director and a Global Footprint Manager. Operations are organised into a number of modules, each responsible for the production of a range of products. The modules each "have an ops manager, a manufacturing engineer or more than one in some cases, a quality engineer, a logistics person and in some cases team leaders" *[Operations Manager 3rd Jun 08]*. Operations are responsible for purchasing materials against contracts and for material logistics. There is a central goods in and despatch, however, each module maintains responsibility for its own material logistics and master production schedule (MPS). "Operations managers own MPS and it is set within the module according to their capacity and any other constraints they may have […] if we have to disappoint the customer it comes back through the module, through the customer intake team, back to the customer" *[ibid.]*. When a new product is introduced a Product Introduction Team (PIN) is formed around a programme manager and representatives from Engineering, Operations and the Supply Chain function. The cross-functional team follows a 7-stage process from PIN 1 (conception) through to PIN 7 (sign off). During this process the VPO&SC will oversee supply decisions and agree these "with the rest of the [Senior Management] Team" *[ibid.]* as necessary.

Under the direction of the Supply Chain Director, the Supply Chain function is responsible for supplier selection, negotiating terms and conditions, the setting up of supply contracts and supplier development.[29] The Global Footprint Manager works with the VPO&SC and

[29] The Operations and Supply Chain functions are not co-located but sit on either side of a wall that divides the facility into production and office space.

the Supply Chain Director to identify the potential for transferring products currently assembled and tested in-house to lower cost facilities owned by the parent company around the world.[30] Over the last ten years Case D has migrated towards buying in items and manufacturing less in-house *[Supply Chain Director 8th May 08]*. The company purchases from approximately 250 suppliers, the majority of these are in the UK but some are also in the USA, India and Mexico. By purchasing mostly sub-assemblies from external providers, the UK site has become a design, final assembly and test operation, as distinct from a manufacturer of its own sub-assemblies from components and raw materials. "We were a manufacturing business, we literally made everything. We're not now. The strategy of the business is very much assembly and test" *[Sourcing Manager 2nd Jun 08]*. 85 percent of production costs are consequently bought in and only 15 percent of costs are attributable to in-house activity *[VP Operations and Supply Chain 5th Jun 08]*. The importance of product reliability in the aerospace industry and the cost / complexity of test equipment means that the product test process is regarded by the company as a core competence, alongside product design. "The whole manufacturing strategy is […] we only wish to do extremely critical processes […] we want to be final assembly and test only" *[ibid.]* Nonetheless, the company does outsource the manufacture and test of some products, for example to a current supplier in the USA so that production of these particular items can be located closer to the end customer *[Supply Chain Director 8th May 08]*.

Case D does not have a written supply strategy. Respondents reported not having "seen it written down" *[Quality Director 7th May 08]*, however, actors discern that supply management routines and procedures, activities and decisions coalesce to form supply strategy. Respondents variously perceive supply strategy as one "that maps and supports our Global Footprint strategy" *[Supply Chain Director 8th May 08]*, or as a four-step process "that basically says look at the business strategy, look at your make or buy" *[Sourcing Manager 2nd June 08]* and as the personal product of the VPO&SC who has "a big input" *[Operations Manager 3rd June 08]* and is "the driver for it" *[Quality Director 7th May 08]*.

Supply strategy process

Three factors guided the make versus buy protocol followed by the company over the last decade. "One was cost reduction, obviously very often supply chain is a lot cheaper than in house" *[VP Operations and Supply Chain 5th Jun 08]*. The decision to relocate the business to a new facility also drove the company away from in-house manufacturing. "There were

[30] The division in these roles is that sourcing from overseas suppliers remains the responsibility of the Supply Chain Director. The Global Footprint Manager is responsible only for the strategy of re-locating some manufacturing into existing low cost sites owned by the parent company.

environmental restrictions. This site is classed as light industrial so dirty processes such as plating, the press shop etcetera, had to be outsourced. Then the third thing was we could not always get the skill based we needed to support some processes, but they existed externally [in the supply chain]" *[ibid.]*. While contextual dynamics played their part in senior management's past formulation of the strategy, the make versus buy decision is now perceived as being "very much in the area of responsibility" *[Quality Director 7th May 08]* of the current VPO&SC. Although "more dictatorial than some" *[ibid.]*, when a make versus buy decision needs to be made, as part of the PIN process for instance, the VPO&SC will generally involve others in the decision; including the manager of the relevant manufacturing module "because whether he makes it himself or whether he purchases it in, [the module manager] is still responsible for making the product" *[ibid.]*. Yet, the final decision is perceived as "resting with" *[Supply Chain Director 8th May 08]* the VPO&SC and the Supply Chain function. "Operations would voice their concern about the complexity of a product and perhaps it should not go into the supply chain, but in terms of make versus buy and the financials, it is very much done within the supply chain team" *[Operations Manager 3rd June 08]*. A pragmatic explanation for this is that the company has "virtually doubled turnover in five years, not increased space and added new product ranges" *[Quality Director 7th May 08]*. Consequently, factors such as manufacturing capacity at times override other considerations. The VPO&SC is reported as having issued directives to purchase items "that went against the make-buy strategy we had already agreed […] purely because he had a [manufacturing] capacity issue. He couldn't cope with it internally" *[Supply Chain Director 8th May 08]*. New product timescales sometimes also influence the Supply Chain function's decision. "Timing is never good, it always seems to go against you, so we make the decision based on an existing supplier that could do a job for us. […] The project [PIN] team have no choice in reality, so timescales sometimes influence what we do" *[ibid.]*.

Recently, Case D has begun to re-evaluate its make versus buy strategy "as we start along the road of the Global Footprint Strategy to re-ask some of those questions" *[Supply Chain Director 8th May 08]*. Case D places great importance on the development of a Global Footprint Strategy. It is driven by the parent company's Corporate Global Footprint Strategy, the purpose of which is to drive down costs by finding opportunities to relocate the manufacture of products to facilities the parent has established in low cost economies, particularly where these are close to the existing customers and/or in emerging markets. "There was a lot of input from the corporate team, […] the input from those guys was labour rates and skill sets we could access. He's got an Indian Manager […] he's also got somebody in Mexico and their job is to really promote those low cost countries" *[Supply Chain Director 8th May 08]*. Rather than manufacturing sub-assemblies in low cost locations for final assembly and test in the

UK, the Global Footprint Strategy entails "picking up the existing manufacturing module from here and moving it" *[ibid.]*, then locating suppliers close to these facilities. "If we're going to do final assembly and test of our motors in Bangalore […] where we could be designing them, we should be putting supply chains into India so that we've got indigenous alignment" *[VP Operations and Supply Chain 5th Jun 08]*. In this way the supply strategy is "aligned to fit the Global Footprint Strategy" *[Supply Chain Director 8th May 08]*. Within Case D, the VPO&SC, the Supply Chain Director and the Global Footprint Manager worked together as a small team to review the products in their portfolio that could align to this strategy. Some UK based or military customers, for example, prohibit the relocation of their products. However, over 18 months to two years the team "mapped out the different product types, […] the customers, […] the raw materials and tried to align that to a map of the world that says this is the logical place for this to be" *[ibid.]*. At the time of this study the project was 75 percent complete and the company was in the process of relocating the production of a motor to India. However, Case D is a unionised company and while it is hoped that new products will continually absorb UK site's production capacity, the outsourcing of production potentially threatens UK jobs. Consequently, specific details of the Global Footprint Strategy are not widely distributed outside of the management team.

Supplementing the make versus buy protocol and the Global Footprint Strategy, commodity specialists from the Supply Chain function are responsible for developing sourcing strategies for approximately 20 commodity groups, such as circuit card assemblies, connectors, wiring, machining, castings and fabrications *[Supply Chain Director 8th May 08]*. A corporately derived 3-step Commodity Strategy Development Checklist is used for this purpose.[31] For instance, circuit card assemblies for motors are sourced in India, for large civil projects they are sourced in Mexico and in the "western world for complex development and military legacy products" *[VP Operations and Supply Chain 5th Jun 08]*. The Commodity Specialists describe formally analysing data on spend by commodity, supplier quality, delivery performance metrics and aerospace authority requirements for the requalification of alternative suppliers (which is expensive and costly) in order to categorise how strategic a supplier is to the business and identify possible alternative sources of supply *[Sourcing Manager 3rd Jun 08]*.[32]

[31] The 3 steps are (1) Profile the Commodity Group: Create a thorough understanding of commodity group in order to develop a commodity sourcing strategy by analysing spend. Product characteristics, total cost of ownership, supply market, supplier cost and performance drivers. (2) Develop the Sourcing Strategy: Define a commodity sourcing strategy that is based on strategic imperatives and commodity segments, opportunities and required relationships, and total cost structure. (3) Structure and Plan Change: Generate a structured and detailed implementation plan that takes into consideration supplier availability / capability in alignment with sourcing strategy, supplier relationship requirements, design / specification changes, and opportunities for reducing infrastructure costs relating to the commodity. (*3-step Review Checklist. Rev 1.1 Feb. 2007*)

Subsequently, when design engineers and/or PIN teams have a new requirement or an existing supplier is underperforming, this analysis is used to pinpoint alternative sources of supply. Likewise, as manufacturing modules relocate to low cost economies, the commodity strategy is revisited to develop the supply base in the new location and align it with the Global Footprint Strategy *[ibid.]*. "In fact, if it is confidential [the Global Footprint Manager] may not come to me, [the Supply Chain Director] would come back saying things have moved on, things have changed, can you look at this?" *[ibid.]*.

Case D's parent company, under the direction of the Chief Supply Chain Officer and his corporate team, are also engaged in developing commodity strategy. Their purpose is to consolidate the Group's combined spend into fewer suppliers and in so doing reduce costs, mitigate supply risks and increase product innovation *[Operational Commodity Manager 6th Jun 08]*. Commodities are grouped into categories, for example metals, mechanicals and electronics, each with its own objectives. For instance, "mechanical commodities are very much about low costs and driving products into India and China. […] Electronics is more about leveraging common spend across suppliers" *[Supply Chain Director 8th May 08]*. Commodity specialists from appropriate group companies are invited to form commodity teams to address a common strategy for a particular commodity. For example, within the electronics category there are six commodity teams, one each for circuit card assemblies, printed circuit boards, box build, interconnect, motors and distribution *[Operational Commodity Manager 6th Jun 08]*. The teams use the 3-step Commodity Strategy Development Checklist and generic tools such as purchasing portfolio matrices (Kraljic, 1983), SWOT analysis and Porter's five forces model (Porter, 1980, Porter, 1985) to analyse the commodity and develop a strategy. Likewise, "there are certainly times when we have a very robust debate about whether something is correct or not" *[ibid.]*. Ideally, the teams look to consolidate a commodity source to four or five suppliers in an appropriate geography. "Something like four to five suppliers, but that's not set in stone. […] It just becomes easier if you are not eight time zones away" *[ibid.]*. Once the strategy has been defined two questions "need to be answered by each division. [Is this a] very good strategy for us and secondly, [can they] go back into their business units and execute against that strategy?" *[ibid.]* If there is agreement, the commodity team will develop an implementation plan. This process commenced four years ago and it is estimated that so far, 25 percent of all commodities have been reviewed *[ibid.]*.

[32] Externally derived, generic conceptual models and tools such as SWOT analysis are also familiar frameworks within Case D, however, it is "up to the individual to develop his own" toolkit *[Supply Chain Director 8th May 08]*. With regard to management information software, the company run a software portal (Aerovantix) that allows suppliers to access Case D's production schedules and produces supplier performance data.

Adherence to a corporate commodity strategy is not binding on group companies, "there are checks and balances that say that you can source outside of the group [commodity strategy] but there has to be a clear and rational reason" *[Operational Commodity Manager 6th Jun 08]*. If a company, such as Case D, believes that a commodity strategy does not work to their advantage, they may submit their evidence to the Supply Management Council (SMC) for that commodity. Consisting of supply chain directors from a number of group businesses, the SMC will review the submission and facilitate a "forum by which we have that conversation and we can understand whether their reasons for not joining into the strategy are valid" *[ibid.]*. Following this process, however, "if a [company] wants to go away and do exactly what they want to do, then there's a sense in which they probably can. […] It is a mandatory process to be involved in the strategy definition […] but in relation to execution […] we should come up with [a strategy that] is very easy for you to go and sell within your business" *[ibid.]*. Nonetheless, the Chief Supply Chain Officer's team monitors non-compliance to group commodity strategies to gauge whether they "have what I guess you would class as renegade divisions, or whether consistently a number of divisions are having difficulty sourcing within the group of strategic suppliers" *[ibid.]*. One respondent commented that in practice "there is a lot of fighting and battling going on between certain [businesses] and the corporate guys. It's all good spirited but it's not necessarily in line with what the corporate guys are looking for" *[Supply Chain Director 8th May 08]*.

Representatives from Case D participate in both the corporate commodity teams and the SMC's. Likewise, the company has adhered to group strategy on certain commodities, although with mixed success. For example, Case D attempted to consolidate spending on PCB assemblies with a recommended supplier in Spain; however, "we're in a situation now where we're with a supplier that was a corporate suggestion, that didn't turn out to be a corporate answer" *[Supply Chain Director 8th May 08]*. Conversely, Case D's experience of following a corporate recommendation to source machined products from China was that the process was slow but "successful in terms of the cost benefits" *[ibid.]*. Markedly, the policy of allowing businesses to retain their autonomy over corporate commodity strategy is, nonetheless, considered to be "wrong" *[ibid.]*. The explanation for this is that when a contract is negotiated with a supplier it is made on the presumption of certain volumes of business. Without a mandatory requirement to corporately adhere to the strategy, no guarantees can be given to the supplier and they are consequently more reticent about offering their most competitive price.

Cumulatively, internal and external actors enact a number of routines and procedures, activities and decisions in the formulation of Case D's supply strategy. These combine

elements of formal and informal process. The make-buy protocol, for instance, is predominantly arrived through informal deliberation in reaction to contextual events. On the other hand, the PIN process, the Global Footprint Strategy and commodity strategies are all formed with reference to some degree of formal analysis as well as through debate and mutual adjustment. Nonetheless, it is evident that formal analysis is also put aside and/or previous decisions are overturned as circumstances dictate.

The figure below – Figure 14 – illustrates how the make-buy protocol, the Global Footprint strategy and commodity strategies interact within Case D. The figure also highlights the interaction between corporate initiatives – e.g. the corporate global footprint strategy and corporate commodity strategies – and the supply chain function within Case D.

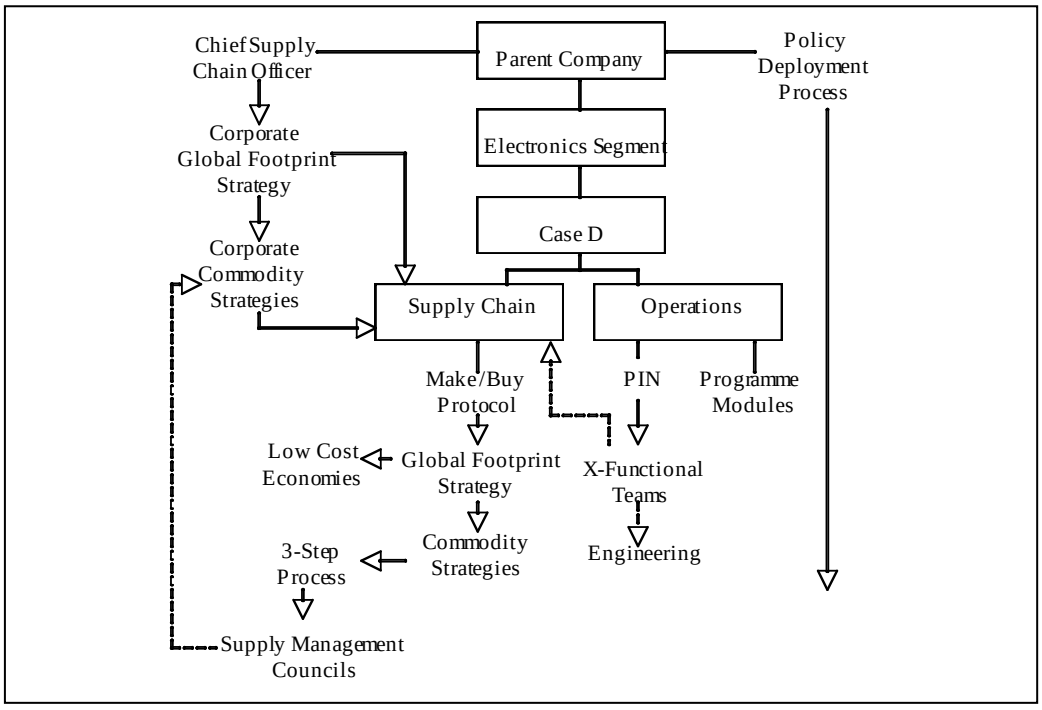

Figure 14. Case 'D' supply strategy process

The scope of supply strategy

Case D's supply strategy is the sum of the decisions created by the make versus buy protocol, the Global Footprint Strategy and the commodity strategies. The focus of these decisions and therefore the predominant focus of the supply strategy is cost reduction. Actors reported, "It is impressed on me to be driven by cost. Everything is about how much something costs" *[Logistics Team Leader 2nd Jun 08]*. Likewise, "My single biggest objective is cost savings, year on year cost savings. My second objective is delivery performance" *[Supply*

Chain Director 8th May 08]. There is, however, a defence for the degree of focus on cost reduction. The company has recovered from being a loss making enterprise in the last five years and "had to address some fundamental issues in the business, our cost base being one of them. If you take 80 percent of the cost of our products as being bought in, we had to address cost in those areas" *[ibid.]*. Nevertheless, some actors disclosed that they were concerned the emphasis on cost reduction was at times too pronounced. "I sometimes think the emphasis on direct savings […] has perhaps veered us off what the right decision should have been" *[Sourcing Manager 2nd Jun 08]*. Significantly, many commodities are inherently immune to a cost reduction strategy. For example, "the cobalt we deal with comes from one manufacturer […] so that does confine any strategy" *[ibid.]*. However, the most prominent criticism is that too keen a focus on cost as the single issue can induce commercial myopia. "If your measure is a cost reduction target year on year […] if you're not careful you overlook the quality and delivery aspects of the business" *[Sourcing Manager 3rd Jun 08]*. One actor elaborated, "The driving point would be commercial leverage. What is going to give us the lowest cost? […] We have outsourced stuff from our own factory to suppliers and found in the longer term […] we've ended up with quality problems. […] We failed to ask basic questions like 'are the suppliers capable?' I think we have lost the plot in terms of a common sense approach to selecting a supplier. […] Where you have a supply chain say in Mexico, you need some kind of local engineering capability. […] I think that is becoming better understood in our business" *[VP Engineering and Quality 5th Jun 08]*. Consequently, while the cost reduction approach to supply has produced "a lot of short-term, very visible savings [it has been conducted] without really considering the costs associated with dealing with less capable suppliers" *[ibid.]*.

There is also a related concern that while collaboration in the selection of suppliers as part of the PIN process can be very effective, "supply strategy has been developed pretty much in isolation from the rest of the business, so the decisions have not been exposed or properly challenged" *[VP Engineering and Quality 5th Jun 08]*. The VPOSC, the Supply Chain Director and the Global Footprint Manager are perceived to be the key actors in the formulation of supply strategy *[Operations Manager 3rd Jun 08]*. "Only in quite recent times has it been exposed to the exec [the Senior Management Team] and it still hasn't been exposed in large parts of the business" *[ibid.]*. Another actor commented on the lack of subtlety in the formulation of supply strategy. "The first step is to recognise that a one size fits all approach to ops and supply isn't necessarily right. […] We have chased down costs, we have chased down inventory, without regard to why inventory is actually needed in parts of the business" *[Director of Strategic Planning 5th Jun 08]*. At an operational level also, the Supply Chain function is considered physically and intellectually removed from day-to-day operations. "I think the

supply chain team would benefit from [exposure to] day-to-day problems rather than looking at a spreadsheet. […] In Operations you are looking at 'are [suppliers] late today?' I think Supply Chain are working more on contracts, looking at the figures. […] I think there is quite a big split really. I don't think there's a lot of communication. […] Recently Supply Chain had to be taken on a tour of the factory because they didn't know where the [manufacturing] modules were. It was a part number and a module code on a piece of paper to them. That, I think, said it all" *[Logistics Team Leader 2nd Jun 08]*. Another assessment was that "it seems that the people selecting and negotiating with suppliers are somehow separated from the impact that the performance of those suppliers really has. Equally the people that are buying those bits day-to-day are not really accountable for the costs, which is 80 percent of our product costs" *[VP Engineering and Quality 5th Jun 08]*.

With regard to the degree of integration between the Case D's business strategy and the supply strategy, the parent company requires Case D to produce an annual business plan. A guidance booklet is produced by the parent company to facilitate this process. This sets out what the content of the plan should be and offers insights, such as the future plans of major customers or commercial concerns that Case D should consider *[Director of Strategic Planning 5th Jun 08]*. At a top level, the parent company has three points of strategic focus: identifying strategic alignments, operational excellence and balanced growth. Balanced growth is concerned with economic leverage across the group and is the strategic goal from which the corporate Commodity and Global Footprint strategies originate. This process of dissemination known as "policy deployment" *[Supply Chain Director 8th May 08]* cascades through each level of the organisation (e.g. corporate, segment, business, function, manager), each interpreting the previous level's objectives. For example, a corporate challenge to address a downturn in MRO revenues might be interpreted by the business as the need to ensure 95 percent spares availability ex stock, and subsequently by the Supply Chain function as an objective to require suppliers to hold larger buffer stocks *[Director of Strategic Planning 5th Jun 08]*. The policy deployment process is supported by the development of performance metrics. Current supply chain metrics included measures of cost savings, on time in full (OTIF) delivery performance, quality and the number of internal Kaizen (continuous improvement) events conducted *[Supply Chain Director 8th May 08]*. The supply base averages an OTIF metric in the low 70 percent range for deliveries into Case D. In turn, Case D averages an 80 to 85 percent OTIF to its own customers *[VP Operations and Supply Chain 5th Jun 08]*.

In conclusion, supply strategy process and the strategy's narrow focus on cost reduction appear to be a function of the VPOSC's view of Case D's business strategy as "win new

platforms [business], cost down the existing, maximise the aftermarket [MRO]" and the company's recent history as a loss making enterprise. The approach has both critics and admirers. The company is now profitable, but opponents highlight how supply strategy is formed separated from its impact and how it is insensitive to a more complex reality.

Chapter 5.

Cross-Case Analysis

Chapter 5. Cross-Case Analysis

This chapter presents a cross-case analysis of the findings from the four case studies. In parallel with the themes of RQ 1, the first two sections analyse supply strategy content within the cases (5.1) and the interaction between supply strategy content and context (5.2). The following four sections address the themes of RQ 2 - supply strategy process activities (5.3), the role of actors in supply strategy process (5.4), the conceptual approach taken to supply strategy process (5.5) and the 'modes' that best describe supply strategy process in the case studies (5.6).

5.1 Supply Strategy Content

Chapter 3 detailed how approximately 650,000 words of transcribed interviews were 'uploaded' into NVivo software for coding and analysis and how, by a process of coding and re-coding, themes were developed within the data. Table 10 (overleaf) shows how data from the case interviews relating to the 'content' of supply strategy in the four cases was coded.

The table illustrates how subject headings, developed from previous category reviews of the supply management literature (e.g. Carter and Ellram, 2003; Croom et al., 2000; Rungtusanatham et al., 2003), were used to group a number of sub-headings, to which data was coded. For example, the main heading *Organisational Behaviour* contains the sub-heading *Human Resources* to which data was actually coded. The table details the number of times data was coded to each sub-heading and also provides an example of coded data for each sub-heading. As noted in Chapter 2, however, the number of times data was coded to each sub-heading was only ever viewed as the starting point for further investigation, rather than as having particular significance in itself. The guiding principle was that data analysis should reflect the priorities and themes of the research (i.e. praxis, practice, actors, content and inner / outer context) – and where possible be supported by secondary data – rather than being concerned with sampling and statistical generalisation.

SUPPLY STRATEGY CONTENT TOPIC	CODED REFERENCES	EXAMPLE DATA
BEST PRACTICE		
▪ Best practice	2	"There's not a flow down of strategy, there's a 'best practice' approach […] that's just based on good procurement practice" - Procurement Marketing Manager, Case B
▪ Industry-wide initiatives	6	"SC21 is having some spin off benefits […] it's opening up some tremendous networking opportunities for the supply chain community" - Procurement Director, Case B
LOGISTICS		
▪ Forecast management information	1	"We have some internal processes, looking at the way we plan and use sales and operations planning to know what it is we want to buy" – Director of Supply Chain Integration, Case A
▪ Planning & control of materials	11	"We'll go and chase down the inventory figures without regard to why inventory is actually needed in some parts of the company" - Director of Strategic Planning, Case D
▪ Capacity planning	31	"The big thing is capacity […] the make-buy will be based around capacity. If sheet metal parts are busy, the group won't involve them in a new project" – Sourcing Manager, Case C
ORGANISATIONAL BEHAVIOUR		
▪ Human resource management	2	"We were in China, a big company, a lot of our machining is there but they also have a foundry. No safety shoes or glasses are provided. Their response was it costs money, (people) are dispensable" – Supply Chain Director, Case D
RELATIONSHIPS, NETWORKS, PARTNERING		
▪ Risk sharing	5	"Procurement try to flow down the risk that we take on to our supply chain, through terms and conditions of business" – Head of Procurement Contracts, Case B
▪ Supplier assessment	3	"We get on more difficult ground when trying to establish low cost sources in countries we don't know well. China for example, they don't have ISO 9100 approval, they don't have an experienced workforce, so where do you start from?" – Quality Director, Case D
▪ Supplier development	20	"I want 5% out of their costs but they'll say 'I can't do it, I'm going to go bust'. How are you going to help them do it? So there's a development relationship; sharing best practice, re-engineering processes, giving them access to our MRP" – Supply Chain Director, Case C
▪ Supplier relationships	38	"Traditionally, (the supplier relationship) was very adversarial – the customer is king and we will beat you up accordingly to get the price. There is some of that which still goes on but equally, there is an emerging trend toward being in partnership and working together, because people are recognising that there isn't any more margin to beat people up for" – Director of Electrical Power Systems, Case A
▪ Supply / distribution base integration	4	"If we are going to do the final assembly and test of our motors in Bangalore, which happens to be alongside our Indian design centre where we could be designing them, we should be putting our supply chain into India so that we have indigenous alignment" – European VP for Electrical Power Systems, Case D
▪ Work share agreements	1	"When you get into the big key suppliers (our customers will say) this is who we want to be providing (systems for the aircraft) and there will be work share elements associated with that" - Business Unit Director, Case B

STRATEGIC MANAGEMENT		
▪ Commodity focus	28	"We took a commodity view. So, we said break everything we buy into a given commodity. The commodities we chose at the time were system orientated; I don't know why but that was the approach we took. There was a quick desktop study done […] then we went through a process of data collection to arrive at a conclusion that said this particular commodity lends itself to rationalisation. We've rolled out two strategies in four years (non-structural commodities and a fabrication strategy) plus two years ago we rolled out a strategy on rigid pipes" – Procurement Marketing Manager, Case B
▪ Parent company commodity focus	13	"Corporate have very much been behind and involved in the drive to get machining up and running in China" – Sourcing Manager, Case D. "I think as well that there is a corporate strategy towards certain companies that the corporation as a whole should be using" – Logistics Team Leader, Case D.
▪ Cost reduction	55	"Our strategy for procurement is the lowest cost; think of today. What can you get out of the suppliers? Tie them into a contract. It has been very focused on cost and we're seeing in some cases, where we're driving for cost we don't necessarily get the quality" – General Manager, Case C.
▪ Global footprint strategy	6	"A global footprint strategy basically takes manufacturing businesses here in the UK and overlays that onto a global footprint which best supports customers, costs and the business in general. So, there's a medium to long-term plan to take some of the products we do in the UK and move them to other areas of the world. The supply strategy then fits with that; so if you move your product to Mexico, there is no point having raw materials come from China" – Supply Chain Director, Case D.
▪ Industrial strategy	6	"The Industrial Strategy has looked at the stuff we're doing in-house and identified key performance indicators; value per employee, value per square foot, is it difficult to move (i.e. outsource). […] It looks at all that and comes up with a list of parts really…" – Supply Chain Director, Case C.
▪ Low cost economies	29	"We need to take the next step and perhaps outsource the whole product line to someone who can manufacture it cheaper than we can, like moving the whole product line to China" – Vice-President and General Manager, Case A.
▪ Product / service quality	6	"(A customer) famously said to my boss, 'we have four suppliers for this item and none of you are any damned good. If one of you could get your act together you could have all of my business'… but I don't think we know how to solve the problem" – Director of Strategic Planning, Case D.
▪ Strategic sourcing	4	"We have broken things down into component parts and I'll take you through it, but it's a sourcing strategy first and foremost" – Director of Supply Chain Integration, Case A
▪ Supplier agility	2	"Even though cost is important, it's all about agility and speed. So the price is not so sensitive, it's the quality and delivery and the speed the supplier can react to us, is kind of key" – Procurement Manager, Case B.
▪ Supply base reduction	11	"I think the main issue is driving cost down. The first way to do that is get smarter about the way you procure by rationalising the suppliers you have, so you can get economies of scale" - Director of Electrical Power Systems, Case A.
▪ Supply network design	1	"We have a U$400m supply portfolio which is growing all the time. As work moves, for example to China, we have to have innovative contracts that allow the Chinese to buy from our suppliers – and some of them don't even want to deal with them to be honest. It's quite a management issue" – Supply Chain Director, Case C.
▪ Terms & conditions	3	"The electronics team from corporate (supply) will define half a dozen suppliers in each commodity area and agree a contractual framework of terms and conditions by which they will trade with (our) business units" – Supply Chain Director, Case D.
▪ Make-buy decision	52	"Manufacturing used to decide make-buy, but we're more involved now" – Director of Supply Chain Integration, Case A "The make-buy decision is made at a senior level in the business" – Head of Procurement Development, Case B. "We have a make-buy decision at the start of each programme" – Sourcing Manager, Case C. "The make-buy tends to rest with the VP Operations & Supply Chain" – Supply Chain Director, Case D

Table 11. References coded for supply strategy content across the four case studies

Table 10 reveals that only ten sub-headings have 11 or more coded references. These account for 84.7 percent of the total 340 references to supply strategy content coded from the case interviews. In descending order these sub-headings are:

1. Cost reduction (55 references)
2. The make-buy decision (52 references)
3. Supplier relationships (38 references)
4. Capacity planning (31 references)
5. Low cost economies (29 references)
6. Commodity focus (28 references)
7. Supplier development (20 references)
8. Parent company commodity focus (13 references)
9. Planning & control of materials (11 references)
10. Supply base reduction (11 references)

In other words, accounts by actors of supply strategy praxis in the case studies reveal that the 'content' of supply strategy in their organisations is predominantly bounded within these ten topics. Each topic is therefore expanded below, to illustrate how the interview participants depict supply strategy 'content' in the focus of their discussions and decisions.

(1) Cost reduction

Interview participants reported that year on year cost reduction is the principal focus of much supply strategy content. "I have programmes at different parts of the lifecycle; I am looking at cost avoidance on the new programmes and cost reduction on the mature programmes" *[Director of Electrical Power Systems, Case A]*. "Get better pricing, […] our procurement strategy is we want the best price" *[Procurement Marketing Manager, Case B]*. "The business is very much driven by reducing costs" *[Supply Chain Director, Case C]*. "My biggest single objective is cost savings, year on year cost savings. If I spent a pound last year, how much do I spend this year? We record that; every single part number that comes through the door we record a purchase price variance for it, every month. We've got those numbers; that's my number one" *[Supply Chain Director, Case D]*. Consequently, examples of cost-reduction behaviours observed in the cases are, "to resource from other suppliers" *[Chief Buyer, Case C]*, "leverage common spend across suppliers" *[Supply Chain Director, Case D]*, or "it will be broken down into action items in terms of leverage, value engineering and outsourcing *[Vice-President and General Manager, Case A]*. The context of the focus on cost reduction is the aerospace sector in which, "around the world the customer (e.g. airlines, governments & aircraft manufacturers) is

continually demanding price down. So your analysis of what drives cost leads you to the supply chain, because 70 percent to 80 percent of our material is bought in" *[Director of Electrical Power Systems, Case A]*.

(2) The make-buy decision

The make-buy decision defines those products, processes or services that are to be sourced internally or obtained from external sources. The make-buy decision can, therefore, be viewed as the first step in supply strategy praxis. For example, in Case B the items that are retained for in-house manufacture (i.e. rotors, wiring looms and gearboxes) are constant across all aircraft programmes. "We understand and talk a lot about those technologies which we wish to keep in house, so we're quite clear about our supply strategy there. It's not necessarily written down anywhere, but it is understood in the business" *[Head of Procurement Development, Case B]*. Conversely, in Case C the make-buy decision has been irregular as in-house manufacturing capacity has fluctuated. "It used to be they (Operations) just dictated […] but I've been forcing them to develop their own manufacturing strategy, to identify their core competencies that they should be making in-house. That means we can have suppliers set up to do that type of work all the time, so when a new programme comes in it is very clear we never make it in-house" *[Supply Chain Director, Case C]*.

(3) Supplier Relationships

The supplier relationship concerns the 'upstream relationship' between the focal organisation and their supplier, their supply 'chain' or supply 'network'. Two issues are notable in the case studies. First, the relationships in the case studies are generally dyadic, i.e. between the focal organisation and a supplier, rather than with a 'chain' or 'network'. "Suppliers have been quite content to take the customary relationship situation. You're the customer, we're the supplier; you supply orders, we supply parts; we supply invoices, you supply money" *[Key Supplier Account Manager, Case B]*. Secondly, the supplier relationship is not always predominantly managed by the supply function. For example, "The Marketing guys or Engineering, in particular, become very aware of these companies (i.e. suppliers). […] Who takes part in forming those strategies really depends on the nature of the product. […] In Procurement, what we are doing is engineering conversations between much more senior people" *[Head of Procurement Development, Case B]*. "Traditionally, the only time we've seen suppliers in here (i.e. the supply function) is whenever we've asked them to come in and present a recovery plan" *[Sourcing Manager, Case C]*.

(4) Capacity Planning

The issue of manufacturing capacity planning is closely allied to the make-buy decision. The desire to optimise in-house manufacturing capacity is a major factor in the make-buy decision. For example, "A debate we've had for the last four years is the capacity of the company, […] the order book is dangerously high and we have increased industrial capacity much more slowly. […] I think we have consistently gone wrong on the issue of production capacity" *[Senior Vice-President, Industrial Strategy, Case B]*. Conversely, a lack of in-house capacity can prompt the decision to source externally. "If the decision is whether to move stuff out (i.e. to purchase externally) […] nine times out of ten it has to happen because the business can't support doing it internally" *[Chief Buyer, Case C]*. One respondent explained how the Vice President of Operations and Supply Chain for their company was forced to reverse a previous make-buy decision because of a lack of in-house manufacturing capacity. "His comment was - I'm going to buy it, I don't care, I'm going to buy it – even though it went against the make-buy strategy we'd already agreed. That was purely at a point in time when he had a capacity issue; he couldn't cope with it internally" *[Supply Chain Director, Case D]*.

(5) Low cost economies

Allied to the subject of 'cost reduction' each of the case companies is, to some degree, exploring opportunities to switch manufacturing and/or sourcing to countries / regions that offer lower labour rates than their current manufacturing or sourcing locations. For example, "(the parent company) visited a lot of companies across the world, Mexico, Russia, China, Taiwan and the selection criteria came up with (China). That was their number one choice, so we have identified packages, taken them out of Japan and put them into China" *[Supply Chain Director, Case C]*. Likewise, "we have always made wiring looms here (in the UK) but there is a strategy that we could put looms out to lower cost economies because the hourly rates here are so high" *[Head of Programme, Case B]*.

(6) Commodity focus

The development of strategies for the procurement of particular commodities – which optimally form part of a wider integrated approach to 'sourcing'[33] - is prominently addressed in the cases, albeit with varying degrees of success. For instance, "We have tried hard to write commodity strategies over the last three years […] actually it has been quite fruitless. A lot of input is missing; there are a lot of elements from the business strategy that don't exist in a mature enough form yet" *[Head of Procurement Development, Case B]*. A respondent in Case C explained, "just recently we have tried to align ourselves more clearly to

[33] See for example, the *'integrated, aligned and global'* model of purchasing processes adapted from RM Monczka (Axelsson et al., 2005).

commodities, but not to the point where you focus everybody strictly on commodities. They have to have an overall business awareness of not just that commodity, but where that commodity aligns in our overall supply chain strategy" *[Chief Buyer, Case C]*. Notably, procurement in Case D is particularly aligned to commodities. "Commodities… we probably have around 20. We have machining, bare PCBs (i.e. printed circuit boards), circuit card assemblies, then next level up we have connectors, wiring, castings, we've got fabrications…" *[Supply Chain Director, Case D]*.

(7) Supplier development

The notion of supplier development is present in all of the cases, but often more as an intention rather than as current practice. For example, in Case A it was explained that in terms of strategic priorities for the supply function, "the fourth piece is supplier development, but right now we are focusing very much on supplier on-time delivery" *[Director of Supply Chain Integration, Case A]*. The practical limitations of working with suppliers on development issues were described in Case B. "The trouble is […] you go in there and they (the supplier) say 'we're happy to develop, happy to introduce change'. (Then we say) we'll have to look at cost reduction, it's going to cost (the supplier) money, we want commitment in terms of resource […] but we only want four or six (i.e. they are a relatively small customer to the supplier). What supplier in his right mind is going to do that?" *[Head of Procurement Operations, Case B]*. In Case C supplier development "is in its infancy, I believe, at the moment. We did supplier development here (years ago) and we had a supplier development group. No doubt we did a lot of supplier development activity, built up plans and all that good stuff. It fell away again, to be honest with you" *[Sourcing Manager, Case C]*. Meanwhile, the danger of failing to work consistently on development issues with suppliers was highlighted in Case D. "We have given suppliers responsibility for process, so they are completely new to them. […] We've found in the longer term that because it's not their core capability, they have not managed to maintain controls and we have ended up with quality problems" *[Vice President for Engineering and Quality, Case D]*.

(8) Parent company commodity focus

The drive by parent companies to develop common commodity strategies across multi-national subsidiaries is evident in cases C and D. For instance, "commodity groups are mostly run out of (the parent HQ) but not exclusively. We run the composite (materials) one out of here with (the parent HQ's) input, because we know much more about composites than they do" *[Vice President and General Manager, Case C]*. Similarly, in Case D, "corporate (i.e. the parent company) have very much been behind and involved in the drive to get machining in China up and running. That's been partially successful. […] There's a casting commodity

team across the whole corporation, […] we've got some corporate activities on utilities, […] again we've got some corporate initiatives and strategy on logistics and transport" *[Sourcing Manager, Case D]*.

(9) Planning and control of materials

The depiction of the planning and control of materials in the case studies highlights two issues. First, how the roles played by the supply function can be largely transactional, once actors outside of the supply function have negotiated 'strategic' matters with the supplier. For instance, "they quite often leave the low value stuff to the procurement guys to decide, as long as it comes in on time. The Programme Managers will just worry about the orders being placed on time to maintain schedule" *[Head of Procurement Development, Case B]*. Secondly, this content reveals that procurement are often not the 'main point of contact' with a supplier, especially once the purchase order or contract has been established. "The day-to-day conversation with the vendor about whether they are delivering late or early - or performing well – that conversation doesn't happen. […] It's the people in Operations (i.e. Manufacturing) who have that conversation (with the supplier). The Operations people are worrying about getting the goods in, at the right price, on the right time, at the right quality" *[Head of Procurement Development, Case B]*. In other words, after the purchase order / contract has been established, it is Operations that manage the on-going supplier relationship and not the Procurement function. The isolation of Supply / Procurement from day-to-day 'operations' also occurs in other other cases. For example, "recently Supply had to be taken on a tour of the factory because they didn't know where the (manufacturing) modules were. It was a part number and a module code on a piece of paper to them. That - I think - said it all" *[Logistics Team Leader, Case D]*.

(10) Supply base reduction

Finally, each of the cases focus on the issue of reducing their number of active suppliers, so that the purchasing spend can be consolidated with fewer suppliers – enabling a greater lever in negotiations with suppliers and better economies of scale such as fewer purchase order transactions. In Case A for example, "The main issue is driving down cost. The first way to do that is get smarter about the way you procure, i.e. by rationalising the suppliers that you have […] which enables you to do more value added activity with them. […] You can't develop 5,000 suppliers… it is just not possible" *[Director of Electrical Power Systems, Case A]*. In Case B, "the Procurement Director has a measure of performance in achieving supplier reduction" *[Procurement Manager, Case B]* and in Case C, "the business is driven by reducing costs; reducing the number of performing suppliers and rationalising the supply base" *[Supply Chain Director, Case C]*. Likewise, a respondent explained that, "the issues around wanting to

reduce costs and consolidation (of the supply base) […] overarch the supply strategies that we do" *[Operational Commodity Manager, Case D]*.

The scope of supply strategy content 'in practice'

In the Literature Review (Chapter 2) a representation of the theoretical scope of supply strategy content was developed (see Appendix 7), based on studies that analysed the subject breadth of the supply literature (Carter and Ellram, 2003, Croom et al., 2000, Rungtusanatham et al., 2003). In the development of the first guiding research question the proposition was made that supply strategy would not empirically address the wide scope of 'content' suggested by the literature. This proposition is confirmed by the above analysis that identifies that the 'content' of supply strategy in the case studies is predominantly bounded within just ten topics rather than the 80 topics in the theoretical model.

However, a number of the ten categories can be further grouped together. For example, 'supplier relationships', 'supplier development' and 'supply base reduction', all reflect a focus on the supply base. Likewise, 'commodity focus' and 'parent company commodity focus' can be combined and also 'the make-buy decision' with 'capacity planning'. These combinations suggest that, for the most part, management attention within the four research cases broadly focuses on only three supply issues:

1. *What to buy* (e.g. the make-buy decision; capacity planning)
2. *For how much* (e.g. cost reduction; commodity strategies)
3. *Who from* (e.g. developing / reducing supply base)

Management attention does focus on issues outside of 'what to buy', 'cost' and 'sources of supply' – for example the interviews contained accounts of risk sharing / transference (5 references) and concern for health and safety standards when work is outsourced to low cost economies (Human Resource Management – 2 references). Nonetheless, additional topics are more often also rooted in questions of 'cost' and/or 'availability'. For instance, references to actors' participation in the UK's Supply Chain 21 initiative[34] were coded in the interviews (Industry-wide Initiatives – 6 references), but Supply Chain 21 companies are committed to three cost related themes - *improving efficiency in the supply chain, removing duplication in business transactions and lowering overheads and costs* – which are all predominantly 'cost' related topics.

[34] Supply Chain 21 is a collaborative programme, known as SC21, to transform aerospace and defence supply chains, run by The Society of British Aerospace Companies and the UK Government.

The activities of each of the case study organisations as they contribute to the formulation and implementation of supply strategy under each of the three headings (what; how; who from) will subsequently be addressed in Section 5.2 - *Supply Strategy Process Activities*. However, before moving on to address supply strategy process, further consideration is given in the following section to the effect of the interaction between supply strategy content and context.

5.2 Supply Strategy Content and Context

The business and international context of the aerospace industry provides some explanation of why supply strategy content is constrained in the research cases. It has long been known that contextual factors such as globalisation bring new challenges to supply strategy process and content (Cooper, 1993). Taking for example, the 'cost focus' observed in the case studies, aerospace businesses are exposed to extensive international competition. Coupled with this, the aerospace industry is dominated by relatively few but consequently very powerful end-customers (i.e. less than half a dozen major commercial aircraft manufacturers and national governments for military sales). As companies compete to win an element of an aerospace contract, equipment sales often realise very little or no profit margin; organisations hope to recover these losses later in the programme through repair and overhaul activities. However, with major manufacturers seeking to introduce new aircraft costing half as much and in half the development time, the call for on-going 'cost reduction' is driven relentlessly along the entire aerospace supply chain. "It is always about cost […] because the punters - you and I - want cheaper and cheaper (air) travel" *[Head of Procurement Development, Case B]*. "You and I might want to fly to Dublin for £9 - which means Ryanair or whoever have to buy their aircraft for less. That means Airbus or Boeing have to make them for less and that connection is not made in a lot of people's minds" *[Director of Electrical Power Systems, Case A]*. "We've got Airbus and Boeing saying year on year '*you are going to reduce your prices*' (i.e. price reduction isn't optional) but there is not an automatic process to get our suppliers to do that too" *[Director of Supply Chain Integration, Case A]*.

The aerospace industry is also highly regulated which presents a barrier to the sourcing of products in the supply chain and creates a need for a quality audit trail, to ensure that all components are suitable for use in aircraft. For instance, "export control regulations are an issue. The US Department of Defense poses particularly stringent regulations and audits us on the International Traffic in Arms (ITAR) regulations. […] Also, if we buy certain products our US Defense customers will require that we buy them from US suppliers. For example, the Berry Amendment in the United States says any rubber raw material has to be

sourced in the USA. So, things like that cause us issues" *[Head of Procurement Development, Case B]*. Likewise, "there are a lot of competition rules that encourage the use of European Union suppliers […] and in the last five or six years, there has been a strong tendency for the rules of competition to be strictly laid down, (e.g.) you were going to run a competition on this basis and you selected on this (other) basis – that's unfair! *[Senior Vice President for Industrial Strategy, Case B]*.

The dynamics of market conditions also influence the focus of supply strategy content in the case studies. For example, in a market dominated by a few aircraft manufacturers, these companies are able to 'out compete' smaller manufacturers and even their own suppliers in the acquisition of scarce materials and processes. "Airbus has just announced a U$32bn deal with Dubai. That typifies large fixed wing programmes. If you are in the rotary wing business, you have to realise that you are going to be squeezed and this will change from commodity to commodity" *[Key Supplier Account Manager, Case B]*. The explanation is that the presence of such dominant companies in the aerospace sector distorts the supply market. Accordingly, other organisations must accommodate the pressure for year on year cost reduction from these companies as customers - which focuses supply strategy content on 'cost' – and they must direct Supply activity to the identification of sources – possibly in competition with their own customer – thereby taking supply function resources from other potentially value-adding activities such as supplier development. The dominant companies are inevitably also subject to the same market dynamics, however. "They are looking at how they can better control or manipulate the titanium and aluminium raw material markets so they can get the product they want for their aircraft because in the aluminium market, for instance, who gets the biggest crack of the whip? The aluminium can makers…" *[Vice President and General Manager, Case A]*.

The slow speed of change in the industry is yet another influence on the content of supply strategy. "If you look at aerospace in general, it is firmly behind other more leading edge sectors, such as financial services and the like. They are a lot more fast-paced and change orientated. We will get there - but a long time behind everyone else" *[Business Unit Director, Case B]*. "Our industry is like an ocean liner. If you want to change direction it takes 20 miles. If you want to do a transformation it takes considerably longer" *[Vice President Industrial Strategy, Case C]*. One impact of the aerospace industry's slow 'clock-speed' is that products must be supported in the field for 20 or even 30 years. This constrains Supply's strategic options in terms of 'what' they can source and 'who from' - as 'legacy' materials / components / processes become more scarce and have long been superseded in faster changing sectors. "By its nature the aerospace sector is much more stable than I was used to

in the automotive sector. The customers may still be fickle but they can't change as easily" *[Quality Director, Case D]*. In other words, switching the source of supply or substituting one component for another is especially problematic in the aerospace sector.

It is also highly probable that 'how' supply decisions are formed also impacts the scope of supply strategy content 'in practice'. In the debate concerning the character of corporate strategy process, it is proposed that the 'what' and the 'how' of strategy - i.e. strategy content and strategy process - should be regarded as inseparable (Pettigrew, 1992b). In other words that the activities involved in supply strategy process, the actors that are engaged in it and the conceptual approach taken should all be regarded as factors that will influence the content of supply strategy. This reasoning accordingly leads to the next section and an analysis of supply strategy process in the four case studies.

5.3 Supply Strategy Process – Activities

This section considers in detail the activities that each case organisation carries out while focusing on the three broad supply issues. These 'activities' can be considered, in part, as those through which actors formulate and implement supply strategy. In other words, they are constituent parts of supply strategy process.

- *What to buy*
- *For how much*
- *Who from*

What to buy

Each of the research cases was considerably occupied by concerns about what the company should manufacture in-house and what it should buy. Two of the research cases - A and C - did not have openly defined make-buy protocols. The make-buy decision for Case 'A' was formulated locally at each manufacturing site. However, the central Supply Chain Organisation (SCO) was beginning to engage in this process, with the intention of reviewing all manufacturing activity over time and outsourcing or purchasing all commodities that were found to be uneconomic to manufacture in-house. Meanwhile, Case 'C's supply philosophy was rooted in the need to adhere to the company's manufacturing schedule. A heavy responsibility was, therefore, placed on supply management to avoid shortages. However, the Operations and Engineering functions that primarily formulated the make-buy decision did so with more of an emphasis on optimising manufacturing capacity. Concurrently, the Industrial Strategy Team were also engaged in proposing the outsourcing

of manufacturing processes to free up factory floor space for higher value products. Consequently, the supply function had often to manage the procurement of an unpredictable bill of materials. They, in turn, pressed their case for Operations and Engineering to develop a manufacturing strategy with defined criteria for what the company would make, would make and simultaneously purchase, or would consistently buy.

Both Case B and Case D had defined make-buy protocols. Case B's senior management team had formulated a make-buy protocol that defined rotors, transmissions and wiring looms as commodities to be manufactured in-house. Outside of these items, however, the specification of 'what' to purchase was a considerable focus of activity within the programme teams. Within these teams, actors from the Engineering and Sales functions played a major role in reconciling the customer's requirement with the technical capability of the supply base. Case D's make-buy protocol to only purchase sub-assemblies and consumables for final assembly and test in-house came about through circumstance. However, the company was engaged in evolving their protocol to consider which product lines could be fully outsourced along with their supply chains, to low cost economies.

For how much

At the forefront of many of the research interviews were accounts of a focus on 'cost reduction'. The primary task for Case A's Vice-President of Supply Chain was to take cost out of the company's supply chain; initially by leveraging purchasing spend across the whole organisation. Working with suppliers to value engineer cost out of products was identified as the subsequent step. Cost reduction was, in fact, pursued to the extent that criticism was made that the SCO rarely considered the needs of the programmes teams over and above the pursuit of cost reduction. Management support for this process was won over a period of two years, however, as initial critics became increasingly aware of the cost reductions needed for their products to remain competitive.

Respondents in the other research cases also pointed to cost reduction as a main driver of supply strategy praxis. Actors described how the introduction of fixed price contracts with their customers heightened programme team awareness of the need for cost reduction in Case B. Actors were, consequently, driven to achieve cost reductions, sourcing where they could get a commodity the cheapest. With cost reduction in mind, the supply function had also attempted to form commodity strategies and had targeted 28 commodities, with the purpose of classifying what was being purchased and from which suppliers. However, this initiative failed due to a lack of information and participation from other functions.

Actors in Case C were encouraged to 'spot buy'. Their philosophy was to take a short-term view and achieve the lowest cost. Where possible, they were expected to get the best deal from a supplier and to tie them to a tight contract. On the premise that a bigger shopping list would attract bigger discounts, Case C's parent company had a strong focus on approximately 30 corporately negotiated commodity strategies. It was said that the biggest drivers of the parent company's supply strategy were commodity strategies and sourcing from 'low cost economies'. In case D, actors were set year on year cost saving targets that even took priority over supplier delivery performance. The company also focused on approximately 20 commodity groups and utilised a three-step commodity strategy checklist to develop low cost sourcing strategies, particularly in India and Mexico.

Who from

Defining preferred sources of supply was a common feature of supply management activity in the research cases - i.e. concentrating supply activity on fewer suppliers and/or developing sources of supply in low cost economies. For instance, Case A's intention was to better target their procurement spend and to realise cost reductions via increased purchasing power with fewer preferred suppliers. The SCO was consequently engaged in merging supply data with product business plans and forecasts, to create a preferred supply base that could be used by the supply function and programme teams working with customers at the bid and proposal stage of a programme.

In Case B, actors were encouraged to avoid expanding the supply base but some interviewees maintained that the supply base needed to be reduced to strengthen the company's purchasing power and reduce transaction costs. It was reported that what was needed was 'not just a case of trimming out dead wood' but making a fundamental change in supply strategy. Case B had already focused on available opportunities by switching some supply to low cost economies, such as China. The company was, in fact, considering the possibility of transferring the manufacture and supply chain for wiring looms, considered to be a key in-house manufacturing competence, to a low cost economy because UK labour rates were uncompetitive. While the establishment of Key Supplier Account Manager roles indicated intent to manage the relationship with key suppliers across multiple programmes, critics maintained that the organisation still failed to form effective working partnerships with the supply chain.

Case C also engaged in reducing the size of their supply base, although actors indicated that this would be achieved 'where they could' rather than as a targeted initiative. Supplier development activity was being revived in the business, however. A decade previously there

had been teams dedicated to this activity. The rationale for its return was that suppliers were increasingly unable to provide further cost reductions without the company engaging with them in development activities, such as introducing Lean-manufacturing techniques. With regard to suppliers in low cost economies, the Vice-President of Supply for Case C's parent company visited suppliers in Mexico, Russia and Taiwan, before selecting to invest in a joint venture with a Chinese aircraft manufacturer - motivated in part by the sales potential of the Chinese market. Notably, the decision to manufacture and source in China was made by the parent company, which then directed Case C's Leadership Team to implement the strategy.

While their Corporate Commodity Strategy process sought to realise economies of scale, Case D's Global Footprint Strategy was intended to drive down costs by relocating the assembly and test of products, together with their supply chains, to low cost economies. These were locations where the parent company had established facilities - most notably in India and Mexico. The Vice-President of Operations and Supply Chain, the Supply Chain Director and the company's Global Footprint Manager had spent 18 months to two years analysing which of the company's products could be relocated and identifying potential suppliers in the new location. The relocation process had just begun at the time of the research interviews, with the transfer of the assembly and test of a motor to Bangalore.

Supply strategy process activity and the link with business strategy

While supply strategy process 'activities' in the case studies focus on these three broad supply issues 'in practice', the supply literature generally presents supply strategy as an extension of business strategy (e.g. Anderson and Katz 1998; Narasimhan and Carter 1998). However, in none of the case studies is supply strategy 'developed' directly from a higher-level business strategy. Consequently, before progressing to consider the actors involved in supply strategy process, this point of divergence between practice and the literature needs to be addressed.

Each of the case organisations does formulate a business strategy, although these are of various forms. Case A's business strategy is a simple consolidation of product strategies based on sales forecasts and customer profiles. Case B has an established business planning function, but deliberately keeps the details of their strategy to as small a number of people as possible. Case C has three strategic objectives prescribed by its parent company and their own leadership team added two others, making five objectives for the UK facility known by the acronym 'GOALS'. Case D has a Director of Strategic Planning, whose role is to develop a business strategy incorporating the parent company's priorities of strategic alignment, operational excellence and balanced growth.

The nearest any of the case study organisations comes to formulating supply strategy process as an extension of business strategy is Case D where, "at the beginning of each year we typically receive a 25 page document that gives us corporate guidance on what we should put in our strategic business plan for our business and how we should go about it; so for example, guidance about some big things going on in the market" *[Director of Strategic Planning, Case D]*. It was recognised that, "the supply chain strategy needs to come behind this" *[ibid.]* i.e. the supply strategy must 'support' the aims of the business strategy, but there is no formal 'process' to ensure close alignment between the two strategies.

Case A has a formal business strategy process but, "only for the past three years have we been looking operationally at procurement, and then only in detail as to how we are going to achieve cost reduction" *[Vice President and General Manager, Case A]*. However, the company had begun to think about engaging "the Supply Chain Organisation with the business level strategists to help transform our operating business" *[Vice President for Strategic Planning, Case A]*.

There is no discernible connection between Case B's business strategy and their supply strategy, primarily because Case B is very cautious about revealing the details of its business strategy, even internally. Executives fear that once "it becomes common knowledge among employees it drifts out and someone else will pick it up" *[Senior Vice President Industrial Strategy, Case B]*. Consequently, they "keep things constrained to just the individuals that need to work on them, which can be a little bit difficult for everyone else, because […] it never gets revealed to them" *[ibid.]* Therefore, supply strategy chiefly 'comes about' in the absence of an awareness of the business strategy.

Finally, in Case C "there's always been a tension between how much we are in control here, because obviously we are a wholly owned subsidiary of (the parent company). […] The major strategic decisions are taken (by the parent company)" *[Vice President and General Manager, Case C]*. Consequently, rather than being an extension of business strategy, Case C's supply strategy is instead more the product of the Leadership Team's adaptation to corporate directives on matters such as offset and the outsourcing of production, and their efforts to maximise the utilisation of production assets and the workforce.

5.4 Supply Strategy Process – Actors

Strategy process research makes it abundantly clear that strategy is rarely dependant on a singe individual or even a small leadership group (Pettigrew, 1973, Pettigrew, 1985).

Although this study adopts functional (supply) strategy as its focus there is still significant evidence of the coalescence of multiple actors, inside and outside the boundaries of the focal function and organization, in supply strategy praxis/practice. Table 12 for instance (see overleaf) highlights the relationships between different sets of 'actors' and 'activities' associated with the supply strategy process. In case A for example, Procurement function actors are primarily engaged in pricing, buying and placing purchase orders. Equally, product teams actors are engaged in identifying sources of supply, setting specifications with suppliers, obtaining quotations and participating in the make-buy decision. Although nominally different functions, they are all involved in the supply strategy process.

What the analysis clearly suggests is that actors within the purchasing/supply function made their contribution to supply strategy through the ongoing enactment of functional capability – undertaking what could be interpreted as transactional activities. There was limited evidence of strategic boundary spanning; with key purchasing/supply actors stepping outside their primary professional domain. Correspondingly, it was actors from outside the function (i.e. Operations, Engineering, senior management, product/programme teams, etc.) who were directly involved in the larger, intermittent and self-evidently strategic elements of supply strategy (e.g. make-buy).

	Case A	Case B	Case C	Case D
Purchasing / Supply Function	Pricing Tactical buying Purchase orders	Cost & delivery information Placing contracts Terms & conditions Fair practice Commodity strategy Key account management Supplier negotiation	Sourcing Terms & conditions Pricing Reduced supply base Purchase Orders Material logistics Supplier relationship Make-Buy (input) Commodity strategy (composite materials) Project 500	Supply contracts Commodity strategy
Strategic Supply Organisation	Economies of scale Value added engineering Reduced supply base Quality, cost & delivery Low cost economies			
Senior Management	Make-Buy	Make-Buy protocol Low cost economies Offset Supplier negotiation		Make-Buy Low cost economies
Programme / Product Teams	Sourcing Specifications Quotations Make-Buy	Budgetary control Customer relationship Supplier relationship Supplier negotiation		New product introduction including new make-buy decisions
Industrial Strategy Team			Make-Buy	
Operations Function		Expediting Material logistics Supplier development	Make-Buy	Material logistics Reduced inventory
Engineering Function		Product specifications	Make-Buy	
Parent Company			Commodity strategy Low cost economies Offset	Global commodity strategy Global footprint strategy

Table 12. The supply strategy praxis (activities) of actors by case study

This separation of iterative functional capability enactment from discrete strategic decision-making is further clarified by comparing the supply strategy content addressed by particular actors with their institutional status. The figure below characterises the activities described in the research cases according to these two factors.[35]

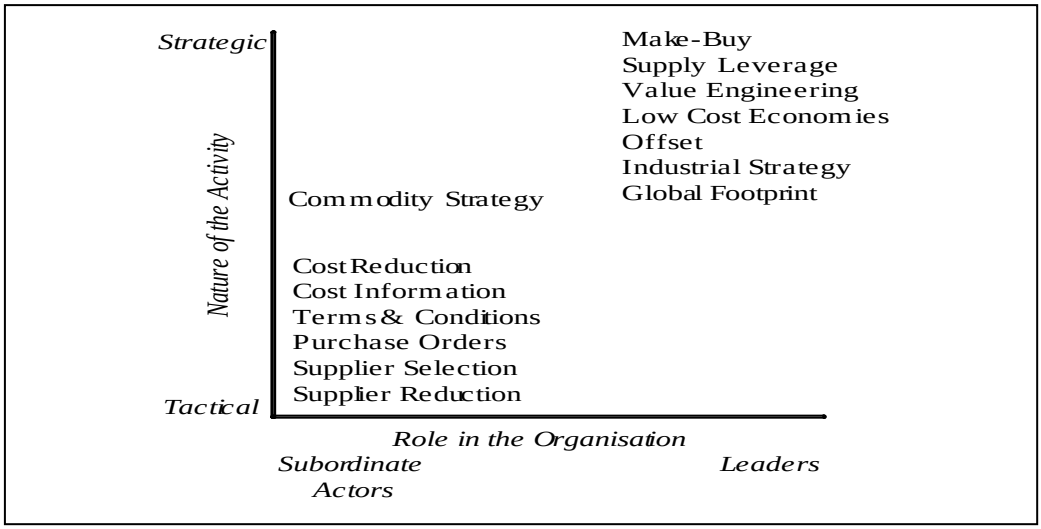

Figure 15. Supply management activities by degree of strategic focus & actor engagement

On a continuum between incremental (emergent) decisions, predominantly manifest in short-term transactions and large-scale (deliberate) decision-making, exemplified by the make-buy decision, it is clear that those actors with explicit institutional authority such as general managers, programme managers, etc. predominated in the strategic 'decisions' aspects of supply strategy. Although hierarchy is clearly therefore an important framing device for strategy (and any sub-strategies), this need not suggest a simplistic hierarchical distinction in functional (supply) strategy between 'top down' and 'bottom up' process elements. In Cases A and B for example, senior managers were clearly 'leading' the process of "formalising" *[Supply Director, Case A]* supply strategy (cf. establishing the make-buy protocol in Case B) but at the same time, it was also evident that key elements of their supply strategy 'emerged' from product team interactions (i.e. powerful organisational actors) with suppliers and customers.

[35] The x-axis 'role in the organisation' relates to the institutional status of the actors engaged in supply activity – such as the make-buy decision – as reported in the case study interviews. The y-axis 'nature of the activity' classifies activities reported in the case study interviews along a continuum from 'tactical' - i.e. those with a short-term aim such as agreeing order terms and conditions - to 'strategic' – i.e. activities with a long-term focus in support of the strategic intent of the organisation.

5.5 Supply Strategy Process – Approach

The 'approach' to supply strategy process is concerned with identifying the conceptual perspective by which each case sets about the 'activities' of supply strategy process, based on the categorisations developed in the field of business / corporate strategy and described in Chapter 2. To recap, numerous perspectives of strategy process have been identified but these may be classified as belonging to one of two classifications: *Classical* or *Emergent* strategy process. In simplified terms, 'Classical' strategy process can be characterised as 'top down' with formal or structured analysis, perhaps involving dedicated strategists. 'Emergent' strategy process can be characterised as 'bottom up' rather than 'top down', whereby actors react to an unfolding reality and engage with intended and unintended outcomes from strategy process. Despite this apparent dichotomy, strategy process 'in practice' is understood to embrace both 'classical' and 'emergent' perspectives as context and situation vary. A third classification - *strategy-as-practice* - can be viewed as complementary to and an extension of previous perspectives of strategy process.

- Case A demonstrates elements of 'classical' strategy process. For example, under the governance of the four General Managers – described as "mogul emperors" *[Vice President and General Manager, Case A]* - and subsequently the Vice President of Supply Chain - appointed to usurp their power and 'leverage' the purchasing spend across the businesses - supply strategy process was directed from the top down. Likewise, the organisation was in the transitional phase of "formalising" *[Supply Director, Case A]* supply strategy process. Conversely, Case A also demonstrates elements of 'emergent' strategy process, especially in the praxis of product teams from which supply strategy 'emerges' through their interactions with suppliers and customers.

- Within Case B, senior management establish the make-buy protocol and programme managers are responsible for making strategic supply decisions for their particular customer programme; both practices suggest a 'classical' top down approach to supply strategy process. However, supply strategy can also be perceived as 'emerging' from the interactions of actors within the programme teams and between these actors and suppliers / customers.

- In Case C, the pattern of strategic decision making for Supply within the senior Leadership Team and their instigation of the development of a 'structured' Industrial Strategy by a dedicated team of 'strategists' suggests a 'classical' approach to supply strategy process. However, as with cases A and B, the instigation of lower level project teams (e.g. Project 500 and SOFE) and the development and widespread

communication amongst the workforce of five objectives for the organisation (i.e. GOALS), suggest a willingness for lower level actors to respond and for supply strategy to 'emerge' from within the organisation.

- Case D represents the most 'overtly' Classical approach to supply strategy process of the four cases. For example, the VP of Operations and Supply Chain and two colleagues formulate supply strategy – including the make-buy decision – 'top down' to be implemented by others in the organisation. Furthermore, unlike the other three cases that adopt a 'top down' approach but do not deploy many formal / structured analytical 'practices' at a senior level, Case D deploys practices such as corporate 'policy deployment', 'Global Footprint' and '3-step planning processes' within the organisation.

5.6 Modes of Supply Strategy Process

The following table (overleaf) summarises the observed 'modes' as inferred from the mix of activity and actors in each case. It is immediately clear that there is no case where there is only evidence of a single mode. Moreover, in their 'presentation' of multiple modes, the cases illustrate that modes of supply strategy process are <u>not</u> mutually exclusive - something perhaps suggested in Hart's original work – and that supply strategy praxis may be generally associated with multiple, simultaneous modes. That said it is apparent that the Command mode is the dominant mode of strategy process in each of the cases; i.e. the Command mode is the only mode associated with every case and Command mode activity was also referenced more often than the other three modes.

Strikingly, Hart's Generative mode does not feature. Before proceeding a justification for its absence is required. According to Hart's description, in the Generative mode 'central direction gives way *completely* to internal entrepreneurship and top management adjusts strategy to fit the patterns of innovations that emerge from below' (Hart, 1992; p334). Hart also states that the Generative mode is *dependant* on the autonomous behaviour of organisational members (ibid. p338) and accordingly, top management's role is to 'encourage experimentation and risk taking' (ibid. p339) in order to be able to select and subsequently nurture the highest potential ideas. In none of the cases does central direction appear to give way *completely* to internal entrepreneurship. In Case A the General Managers - vividly self-described as "mogul emperors" *[Vice President and General Manager]* - competed for top down control of supply strategy with the VP of Supply Chain. In Case C top down direction was maintained by the Leadership Team and in Case D, the VP Operations and

Supply and two colleagues performed the same function. Although there clearly was evidence of some autonomous behaviour across the cases, it did not correspond with the picture of 'skunkworks, innovation time and […] individual and team-based innovation' (ibid. p339) described by Hart. Likewise, the description of top management encouraging experimentation and risk-taking does not accord with the regulated, risk-averse, aerospace sector.

	COMMAND	***SYMBOLIC***	***RATIONAL***	***TRANSACTIVE***
CASE A	General Managers VPSC Programme Teams *(10 references)*		The Process of 'formalising' the Supply Strategy *(8 references)*	Programme Teams *(14 references)*
CASE B	Make-Buy Protocol Programme Teams *(20 references)*			Programme Teams (16 references)
CASE C	Parent Company Directives Make-Buy Protocol Leadership Team Industrial Strategy *(20 references)*	GOALS Business Priorities *(7 references)*		Project 500 SOFE *(9 references)*
CASE D	VPOSC & Supply Chain Director Make-Buy Protocol Global Footprint Strategy Parent Company Directives *(17 references)*		The 3-Step Sourcing Strategy Review Process *(16 references)*	
Total Number of Refs:	**67**	**7**	**24**	**39**

Table 13. Supply strategy process 'in practice' by mode / case

The Command mode

All of the case studies exhibit a pattern of praxis in which a senior actor and/or a small team formulate certain types of discrete strategic supply decision. These are subsequently passed down as 'instructions' for other actors to follow. Such praxis is clearly identifiable with the Command mode of strategy process.

In Case A the general manager of each of the four business units operated semi-autonomously under the umbrella of the corporation. Within this structure, the purchasing

director at each site reported to one of four general managers, who each guarded their independence and authority over supply decisions. This included the make-buy decision that was typically taken by site operations management and the general manager. Motivated by the need to reduce costs, the Group President appointed a Vice President of Supply Chain (VPSC) who in order to be effective perceived the need to appropriate some of the general managers' authority over supply management. The VPSC then structured the SCO around commodity groups and commanded the SCO to continue the pursuit of cost reduction, despite accusations of inflexibility from the business units and programmes.

Although Case B was 'outwardly' less Command mode focused than Case A, there was clear evidence of 'top down' praxis. For instance, the senior management team 'decreed' that the dynamic systems of a helicopter were critical organisational capabilities and as a consequence all electrical looms, transmissions and rotors were to be manufactured in-house (i.e. the make-buy decision). Similarly, the Programme Manager was presented as the ultimate authority on each customer programme (e.g. maintaining budgetary control over all expenditure). The process used to select other programme team members was described as 'arbitrary'; with the result that programme teams were often perceived as being composed of dominant personalities from the Sales and Engineering functions. The supply function was usually only engaged on the periphery of these teams, providing cost and schedule information to the decision makers. Having formulated the strategic supply decision, the Programme Team only formally re-engaged with the supply function with instructions to contract with suppliers and process purchase orders.

In case C, the Command mode was evident across two levels of analysis: from corporate headquarters to SBU, and from SBU senior management to the supply function. They shared very similar characteristics. The parent company issued a series of directives to place supply contracts in certain geographic locations to support sales bids, group 'offset' obligations and/or cost reduction initiatives. Commodity strategies that created mandatory supply contracts were also negotiated by the corporate supply function. Similarly, *within the business*, the local leadership team required any supply contract over £30k/year to be referred to them for approval and a small group of senior management from the Operations and Engineering functions was primarily responsible for formulating the make-buy decision. Although the supply function was attempting to become more engaged in this process, interview participants described how Operations and Engineering drove the decision 'inconsiderately' and 'imposed' the consequences on the supply function. For instance, the decision to offload manufacturing capacity to the supply chain or bring back 'in-house' items that had already been assigned for external manufacture.

Case D was also strongly associated with Command mode praxis. Although other actors were engaged in the decision (in particular the manager responsible for the end product) the Supply Chain Director and his superior, the Vice-President of Operations and Supply Chain (VPOSC), had explicit authority over the make-buy decision. Actors reported, for instance, that the VPOSC would unilaterally override a previous make-buy decision when circumstances required it. The VPOSC, the Supply Chain Director and the Global Footprint Manager made up the small team that reviewed opportunities to relocate the manufacturing of products and their supply chains to low-cost economies. This 'Global Footprint Strategy' was itself the product of a corporate policy deployment methodology from the parent company - part of the parent company's 'Corporate Global Footprint Strategy' - which had established manufacturing campuses in low-cost locations in readiness for subsidiaries to relocate their production.

The Symbolic mode

Only one of the research cases also (i.e. in addition to Command mode) exhibited patterns of praxis that were clearly identifiable with the Symbolic mode. Case C presented a pattern of praxis in which the supply strategy was, in part, driven by an intent set out by leaders as an inspirational challenge to actors in the organisation. Three corporate objectives and the Leadership Team's two local initiatives - forming the acronym 'GOALS' - were ubiquitous across the organisation; appearing on posters, diaries, mouse mats, etc. They formed the basis for a *'Customer Credo for Delivering an Amazing Customer Experience'* that each employee was asked to commit (by signing a document) to upholding. Although it was difficult to assess the degree to which individual actors were actually influenced in their day-to-day activities by 'GOALS', it is plausible to speculate that ubiquitous objectives strongly influence strategic behaviour: for example, the focus on cost reduction is a response by actors to the Symbolic praxis; in this case to eliminate waste. Other strategic objectives, such as to advance to higher-level products and services and leverage new business, were both being operationalised in the development of Case C's 'Industrial Strategy' and 'Transformation' initiatives.

The Rational mode

The Rational mode is reflected in structured, formal planning approaches to strategy. Such a system is followed by actors and evaluated and controlled by the leaders of an organisation. All of the cases offered evidence of the use of discrete analytical tools. In Case B for example, a supplier assessment tool was used in supplier selection decisions. Likewise, the Purchasing function used SWOT analysis and purchasing portfolio matrices in their

decision-making. Case C also used SWOT analysis and in particular, a 'sourcing scorecard' that was developed in-house to assist with supplier evaluation. None of the organisations had adopted a comprehensive structured supply planning system (in the style of many corporate strategy planning cycles and suggested by many supply strategy scholars and consultants). Indeed, none of the cases had even produced a written supply strategy document, which is frequently the output of a formal planning system.

Despite this, in two cases (A and D) there were clearly patterns of praxis that were identifiable with the Rational mode. Although still in the early stages of its evolution, case A was developing a formal supply planning system that would bring together the disparate business and product strategies with the centrally formulated commodity strategies. This was intended to be a first attempt at realising a cyclic supply strategy formulation process for the whole organisation, co-ordinated by the Supply Chain Organisation. In case D, actors within the Supply Chain function follow a well-defined, corporate three-step 'Review Checklist' in the development of sourcing strategies for approximately 20 commodity groups. The steps include profiling and the development of a sourcing strategy, followed by the generation of a structured and detailed implementation plan. The development of such plans represents a core activity for the Supply Chain function. Although arguably still a discrete practice like Case B's sourcing scorecard, Case D's three-step process is distinctive and noteworthy because it is an embedded corporate process, it is maintained and revised in written form, it is highly structured, widely understood and used extensively by actors across multiple commodity groups.

The Transactive mode

The Transactive mode of supply strategy process is associated with social interaction between actors, who are empowered and enabled by leaders to formulate supply strategy through their interface and mutual adjustment. Social interaction between actors is facilitated in all four of the case studies by three contextual factors. First, actors have often been with their organisation a long time, enabling relationships between individuals to develop over years. "There are people that have been here a long time" *[Supply Chain Director, Case C]*. In fact, on average a Case C employee will have been with the company for eleven years *[Vice President Human Resources, Case C]*. "We're not faced with a lot of staff turnover" *[Sourcing Manager, Case C]*. Secondly, the cases are each in distinct locations where communities of employees have formed close to the company. For instance, Case D's workforce built up around the company when it first moved out of London in the 1950's. The current workforce, for the most part, still lives within 15 miles of the company. Likewise, Case C is situated in a geographically distinct region of the UK, where they are the major public sector

employer. Consequently, all of Case C's Leadership Team - except one - grew up in the region. Finally, the aerospace sector is itself a relatively small community of individuals often with a shared background, such as the military. Where there is employee attrition, actors often move within the industry and therefore maintain and/or develop previously established relationships. Case B was described, for instance, as "a club for people who like tinkering with helicopters" *[Head of Procurement Development, Case B]*, which illustrates the shared 'fascination' for aerospace that brings actors together and fosters their relationships.

The Transactive mode was observed in three of the case studies; Cases A, B and C. In Case A, a business unit will form a new 'programme team' to co-ordinate a bid for a customer contract. If successful, the programme team - run by a programme manager - will remain intact to manage the contract through to final delivery. Within the teams, a process of mutual adjustment and interaction between team members forms supply decisions. For instance, "I have to have a lot of knowledge and expertise in the areas in which procurement support me, so we do a lot of that ourselves. My technical guys engage with senior people in the supply chain when I need to work on bigger pitch strategies. […] We give procurement an insight into the volumes of the programme, what we're doing, what we're likely to sell" *[Business Development Director, Case A]*. However, while members of the Procurement function "are involved on a daily basis in the meetings and discussions that we have" *[ibid.]*, their involvement is described as being "very much at the tactical level rather than a strategic level" *[ibid.]*.

Likewise, when a customer places an order with Case B a programme team is also established - with a manager as its leader - to manage the order through manufacturing to final delivery. Other members of the programme team are co-opted from the demand and supply sides of the company, although the process of selecting team members was described as "arbitrary" *[Supply Chain Development Manager, Case B]*. Strategic supply decisions for the programme are, subsequently, arrived at in accord with the Transactive mode, i.e. through discussion within the programme team in consultation with Engineering *[Key Supplier Account Manager, Case B]*. These decisions are 'signed off' by the Programme Manager, who controls the supply budget for the entire programme. Notably, Procurement's involvement in the programme teams is regarded as only minor and in the main, Procurement is required to only provide cost and schedule information to the decision makers. "You're very much held at arms length and you're told what the answer is. You're told what the (supply) strategy is going to be…" *[Head of Procurement Development, Case B]*.

In their Project 500 Workshop and joint Sourcing, Operations, Finance and Engineering project teams (SOFE), Case C also forms cross-functional teams that facilitate interaction between actors, although adoption of the Transactive mode is, overall, less evident than in cases A and B. Project 500 and SOFE are both cross-functional initiatives aimed very specifically at addressing cost reduction issues. "Project 500 is really a cross-functional team to take us from 4 percent to 8 percent margin (and to do so) we need to take 500 million out of our spend" *[Supply Chain Director, Case B]*. Similarly, "Sourcing, Operations, Finance and Engineering go into a company (i.e. a supplier) and do a very deep dive. We say at the end of it we want to give a third of the savings to our customer, a third to the supplier and a third to us. Any opportunities we identify that's how we split it, so it's very much a win-win" *[Ibid.]*.

Cases A, B and C are therefore all associated - to varying degrees - with Transactive mode supply strategy process. However, it has already been noted in the discussion of the Command mode that while Case B is 'outwardly' most associated with the Transactive mode, Case B also demonstrates small group decision-making and top down direction setting within the programme teams that is associated with the Command mode. Significantly, this configuration of Command mode behaviour is also replicated within Case A's programme teams. For instance, "I've got a team under me of programme and business development managers, so I would tell them and they interact with Procurement. […] I wouldn't expect to be involved in anything day-to-day in the supply chain" *[Business Development Director, Case A]*. It is, therefore, worth noting that a form of duality exists in cases A and B in which supply strategy praxis is simultaneously associated with both the Transactive and Command modes.

The development of 'secondary' modes

The degree of control that organisational leaders exert over the supply strategy process progressively decreases from the Command mode to the Symbolic, then the Rational and lastly the Transactive mode, while the necessity for complex practices and information flows increases at each progression. Given this sequence, some consistency in the development of secondary modes of strategy formulation might be anticipated. For example, supply strategy praxis might be observed associated with adjacent pairs of modes (i.e. Command-Symbolic; Symbolic-Rational; Rational-Transactive) and/or there might be an observable progression from the least 'complex' Command mode to the most complex Transactive mode, with each case plotted somewhere along this continuum. The empirical data does not reveal an orderly progression of this kind, however. The absence of an orderly 'hierarchy of modes' therefore suggests the influence of additional factors in determining the mode(s) exhibited by organisations.

Drivers of supply strategy mode

Finally, before moving on to discuss the research findings, consideration is given to whether 'what' is purchased by the case study organisations influences which 'mode(s)' of supply strategy process they adopt. Analysing the purchasing activity of each research case by the relative breadth of the products purchased and the relative technical complexity of the purchased items reveals that each case has a unique profile.[36]

- Case A - a broad range of items from consumables, to off-the-shelf items and sub-assemblies of a medium level of technical complexity
- Case B – a broad range of range of items from consumables, to off-the-shelf items, sub-assemblies and complete systems of a high level of technical complexity
- Case C - a narrow range of consumables and raw materials with a low level of technical complexity
- Case D – a narrow range of consumables and sub-assemblies with a medium level of technical complexity

Plotting these profiles on a diagram, with the breadth of items purchased from narrow to broad on the X-axis and the relative technical complexity of supply management from low to high on the Y-axis, illustrates variety in the research cases.

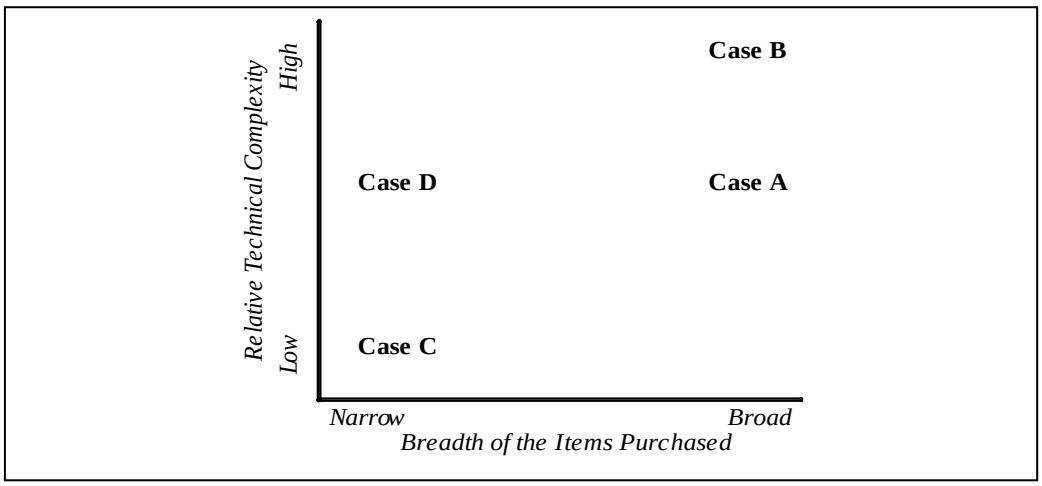

Figure 16. The relative breadth / complexity of supply management by research case

[36] Technical complexity was assessed on the basis that Case C fabricates metal & composite material structures requiring a knowledge of relatively low technology in supply management; cases A and D manufacture aircraft systems requiring knowledge of a greater number of relatively higher technologies in supply management; Case B incorporates multiple systems within its aircraft requiring the highest degree of technical knowledge in supply management. Supply management does not infer the supply function. The technical knowledge may reside in Programme Teams or with actors outside of the supply function, such as from engineering or technical sales.

On the Y-axis there appears to be little or no association between the relative technical complexity of supply management and the modes associated with each case. For instance, cases B and C appear at either end of the continuum, yet their praxis is associated with relatively similar modes (Case B - Command & Transactive modes; Case C - Command, Symbolic & Transactive modes). On the X-axis, however, cases A and B both feature in the broad/complex quadrant of the diagram. Both are also associated with the Command and Transactive modes, albeit with a leaning toward supply strategy driven by a leader and/or a small team.

Such praxis can be viewed as a predictable response to the challenge of managing a relatively broad and technically complex supply portfolio that requires extensive technical knowledge and a high degree of management co-ordination. Similarly, risk has been shown to be a stronger influence than an organisation's core competence when actors are engaged in formulating the make-buy decision, with actors being more sensitive to uncertainty (Mantel et al., 2006) – such as that associated with a broad and technically complex supply portfolio. Consequently, it is plausible that what is purchased has a significant influence on supply strategy modes.

5.7 Synopsis of this Chapter

This chapter has presented a cross-case analysis of the findings from the four case studies, examining supply strategy content, the interaction between content and context, supply strategy process activities, the specific role of actors, the 'approach' taken to supply strategy process and the use of 'modes' to 'describe' supply strategy process. This analysis is further developed in the following chapter – Chapter 6.

Chapter 6.

Discussion of the Research Findings

Chapter 6. Discussion of the Research Findings

Supply management's lack of engagement with the supply strategy process – and the correspondingly limited understanding of how process characteristics interact with contextual factors, strategic content and actors - led to the research questions that guided this study.

RQ 1. What is supply strategy content 'in practice'?

- *What is the scope of supply strategy content?*
- *What is the nature of the interaction between supply strategy content and context?*

RQ 2. What is supply strategy process 'in practice'?

- *What activities are involved?*
- *Who are the actors that engage in supply strategy process?*
- *How is supply strategy process approached?*
- *Which mode(s) best describe supply strategy process?*

The application of this set of questions in four in-depth case studies has generated a rich set of findings. These findings – albeit anchored in a potentially atypical single sector – highlight some specific points of divergence between the extant literature and actual supply strategy practice. Four gaps emerged as particularly significant when compared with the observed practice in these cases. First, the supply literature over-emphasises a number of areas of content. For example, the centrality of supply chain and network relationships is constantly stressed whereas this study revealed limited evidence of boundary-spanning activity. Second, much of the literature lacks any meaningful sense of contingency, whereas contextual factors seem to play a significant role in constraining the total 'space' allowed to supply strategy. The generic nature of the literature is also reflected in overly broad descriptions of content that are inevitably irrelevant in many specific applications. Third, theory tends to, underplay the multi-faceted roles played by strategy actors and finally, the process literature tends towards an over-simplification of theory, whereas the case studies reflect both alternative and complimentary conceptualisations.

6.1. Supply Strategy Content and Context

None of the case firms had explicit documents delineating their supply strategy; as a result decisions and actions recounted in the interviews (cross checked against descriptions of functional responsibilities) were used to identify the scope of supply strategy content. One of the most striking observations from this data was - when compared with the many topics that make up the literature (e.g. Croom et al. 2000) - the relatively narrow content scope. Indeed unlike the six categories containing 80 topic headings contained in the theoretical model developed in the review of the literature (see Appendix 7), supply strategy content could be distilled to three broad issues:

1. What to buy? (e.g. the make-buy decision; capacity planning)
2. At what cost? (e.g. cost reduction; commodity strategies)
3. Who from? (e.g. developing/reducing the supply base)

The evident cost focus of the cases can, to some extent, be simply explained as a response by the firms to market conditions; i.e. a small number of dominant aircraft and aero-engine manufacturers driving a 'cost reduction' theme through the supply base, in response to their customers' (civil airlines / Governments) and the public's demand for cheaper air travel and more financial prudence in military programmes. On the other hand, since the association between supply and the performance of the firm remains difficult to establish and hotly debated (e.g. Frohlich and Westbrook, 2001; Rosenzweig et al, 2003; Vickery et al, 2003), a focus on 'cost reduction' might also be seen as a straightforward and direct way for the supply function to quantify its contribution to the firm. Furthermore, a significant relationship has been suggested between the relative level of 'professionalism' in the supply function – i.e. its 'maturity' - and the function's ability to realise cost reduction in the supply chain (Schiele, 2007). Counter-intuitively, more cost-reduction potential exists in relation to greater 'maturity'. Given that some respondents in the cases described a relatively low-level of 'professionalism', it may be that these four firms have to focus relatively high levels of time and other resources on 'cost' to realise savings.

Not only was the supply strategy content narrowly focused relative to the breadth of the literature, the content also inclined towards transactional rather than what might be traditionally considered as truly strategic topics. For example, instead of being engaged at the centre of the make-buy decision – by definition a strategic decision - the supply function more often played a supporting role. "The make-buy decisions are being made at a senior level in the business" *(Head of Procurement Development, Case B)*, "Manufacturing decide make-buy. […] As far as ownership of that process… it's probably owned by the businesses"

(Director of Supply Chain Integration, Case A). Rather than looking to create strategic alliances or strategic networks of supply (e.g. Cigolini et al, 2004; Gadde et al 2003; Hakansson and Persson 2004; Harland et al. 1999; Moller 2006; Narasimhan et al. 2008) the cases reflected a clear focus on dyadic supplier relationships. "I think that's the nub of it; it's the extent to which you partner and form relationships back into the supply chain and until now that hasn't been done" *(VP Industrial Strategy, Case C)*. "We're not good at doing our tier ones right now, so we need to develop that before we go to our tier twos, i.e. it's primarily a dyadic relationship" *(Sourcing Manager, Case D)*. Interestingly, other empirical studies have also found that few practitioners actually operate across extended networks (Storey et al., 2006) reinforcing a sense of a literature, arguably ahead of practice, that mandates what scholars suggest 'should be', rather than 'what is'.

One possible interpretation of these content misalignments is that many of the specific findings that manifest as too much breadth for the supply literature, actually reflect a failure to take sufficient account of context. On the one hand, there are findings that strongly align with the literature. For instance, how important organisational structures are to supply strategy formulation and implementation. In one case, the actors that select suppliers did not manage day-to-day contact with the supply base. "The logistics side of the supply function place the purchase orders, but at the terms and conditions and the prices we (procurement) agree with the supplier. […] So, if logistics say it's late it's because we selected the wrong supplier! It might also be the wrong processes, or the way we manage the supplier, but we don't sit down and analyse it" *(Chief Buyer, Case C)*. The consequence of not analysing the underlying problem is that issues can fall into the silos within the supply function and strategic solutions to problems are subsequently not developed. "The way I see it is our Supply organisation is split into two parts: supplier selection, terms and conditions, the negotiation bit of it. Then you've got the transactional buyers. Having that split means that the people selecting and negotiating with suppliers are somehow separated from the impact of supplier performance. Those people buying bits day-to-day are not really accountable for the costs of those bits, so our product profitability isn't very good. The organisation of the supply function doesn't seem to be thought through" *(Vice-President of Engineering & Quality, Case D)*.

Nonetheless, consider a topic that has featured very strongly in the supply literature: e-business, (Croom, 2005, Hafeez et al., 2006, Wagner et al., 2003, Croom, 2000, Knudsen, 2003, Peleg et al., 2002). None of the case organisations had or were developing e-business capability but we cannot conclude that this is not a topic of interest to all supply practice; rather its absence from these findings almost certainly reflects sector specific attributes (e.g.

relatively slow-cycle resources and markets). In other words, the lack of e-business content reinforces the need for more contingent prescription and much greater sensitivity to context in the supply literature. Supply strategy content should only be evaluated in the light of an understanding of the context in which the supply strategy is to be realised. In evaluating empirical findings against the theoretical breadth of supply strategy content as represented in the literature it is, accordingly, essential to understand that all content is not equal. It is only when context is taken into account, that the scope of content in a supply strategy can be appraised against the strategic objectives of the strategy.

Contextual constraints on the supply strategy 'space'

The narrowness of the observed strategy content leads directly to reflection on what causes this attenuation of strategic scope. Despite exhortations in the literature to engage in strategic supply activity (e.g. strategic alliances, value engineering, supplier involvement, etc.) the findings highlight a range of contextual factors that appear to constrain the ability to act strategically. The data suggests that three 'types' of contextual factor particularly restricted opportunities for actors to create supply strategy in certain content areas and as a result, moved supply strategy making activity (i.e. praxis) towards topics of supply strategy where actors perceived that they could make a meaningful contribution. These contextual factors are sectoral dynamics, supply markets and the background of senior actors.

Sectoral Dynamics

Sectoral dynamics describe contextual factors within an industry sector that determine the competitive behaviour / strategic behaviour of organisations. For instance, the case studies are all aerospace firms and the lifecycle of an aircraft programme is commonly 30 to 40 years. This means that manufacturers in the sector often have to support aircraft and systems in the field using technology that has become increasingly outmoded and rare. "If your product lifecycle is nine months for a laptop computer before it is out of date, that is going to generate a different dynamic and pace than looking to support the same laptop 47 years later" *(Business Unit Director, Case B)*. The constraint that this places on the supply function is that the choice of suppliers for materials and commodities destined for legacy products is often very restricted. "There's either tooling or certain product knowledge that is difficult to reproduce elsewhere, so we're restricted in terms of where we can go" *(Supply Chain Director, Case D)*.

Many other sectoral dynamics were observed in the cases. For example, associated with the issue of 'legacy' is product obsolescence. During the long product lifecycle, the obsolescence of an item used in the manufacture/support of a product can occur in two ways.

A change in legislation, for example the prohibition of lead in solder, can leave manufacturers with sufficient time to adapt to the change. An evolution in the industry, on the other hand, occurs more rapidly and offers the manufacturer less time to react. A major supplier going out of business, ceasing certain product lines, or losing and not replacing key skills might bring this about, for instance. The consequence is that channels of supply can rapidly reduce to just a few or none at all. One respondent explained, "We use Company X computer chips but they take chips out of manufacture as soon as the volume market has gone away […] Then, we have to buy 20 years supply" *(Vice-President and General Manager, Case A)*.

In many instances, customers also specify that particular suppliers must be used as a contractual condition. This is most often the case when dealing with military sales and it severely restricts the manufacturer's autonomy to freely select and develop their own supply chain. "On certain programmes you are directed to a particular source or sub-contractor that has to be used" *(Supply Director, Case A)*. This is especially so for large systems such the radar, communications or weapons systems. "Large equipment suppliers will be marketing their products, directly to our customer very often" *(Key Supplier Account Manager, Case B)*. In other cases, while not a contractual condition the customer will indicate 'a preference' for a certain supplier. One respondent explained that their customer, "…dictated to us; here's a supplier we've used in the past, go and use them" *(Supply Chain Director, Case D)*.

Large military contracts are also frequently the subject of significant political lobbying. For example, to ensure that employment is protected in a region lobbyists will try to ensure that certain suppliers must be accommodated in a programme if it is to get political support. As explained by one executive, because of political lobbying "right from day one it was agreed that Company X would do the cockpit displays and Company Y would do the structure" *(Head of Programme, Case B)*. Furthermore, customers can also prohibit the inclusion of suppliers and commodities from specified countries. "Some of our customers won't let us move products, either they want them made in the UK or a lot of them are ITAR restricted[37] so we can't just move them to China, for example" *(Supply Chain Director, Case D)*.

The option to source legacy/obsolete products from alternative suppliers can also be problematic, as aerospace regulations often require the 'requalification' of an item obtained from a new source. Qualification is the process through which a commodity must pass to be

[37] International Traffic in Arms Regulations (ITAR) - a set of United States Government regulations that control the export and import of defense-related articles and services on the United States Munitions List

qualified by the aerospace authorities[38] as approved for use in aircraft manufacturing. "Whether you do a military certification or a civil certification, these are lengthy and expensive processes. So of course, that represents a significant switching barrier" *(Head of Procurement Development, Case B)*. The result is often that a "supplier is for life" *(Head of Support Solutions, Case B)* because "you need to re-qualify" *(Vice-President Finance & Customer Support, Case C)* and requalification "can cost millions of dollars" *(Supply Chain Director, Case D)*.

Finally, the case studies often displayed innate conservatism that is fuelled by risk aversion. The desire to avoid risk inhibits risk-taking behaviour that can even take precedent over cost in decisions such as supplier selection. "A supplier may not be able to hit the target price but if there are no other choices at the right risk level, whether delivery risk or technology risk, they get selected" *(Vice-President Finance and Customer Support, Case C)*. One executive explained, "we were encouraged to stick with existing suppliers as the route of lowest risk" *(Head of Procurement Development, Case B)*. Likewise, "I tend to go back to existing suppliers because you have a history, an experience a relationship" *(Logistics Team Leader, Case D)*. Even when other signals encourage actors to embrace more risk, conventional attitudes apply the brake. "We are probably quite risk averse and the message coming down from the CEO is that they want us to take more calculated risks and be more entrepreneurial… but it's a heavily regulated business" *(Supply Chain Quality Manager, Case C)*.

In other words, supply strategy process needs to be sensitive to – and may be contingent upon - sectoral dynamics. When they are comparatively stable, resource positions can be strongly shielded from competitive pressures by mechanisms that are durable and enduring. In economic terms, such resources exploit scarcity characteristics that are derived from factors that are extremely difficult to imitate. However, analysis of the four case studies revealed sectoral dynamics that are sufficient to constrain actors' ability to act strategically.

Supply Markets

The ability to formulate strategy presupposes that viable alternative courses of action are accessible to the strategist. The research cases demonstrate, however, that the aerospace sector is a market in which suppliers often control the availability of commodities and processes, thereby further curtailing actors from strategically developing viable alternative sources of supply. For example, "sometimes you develop a commodity over time with a supplier and they have the intellectual property rights. So… if a new requirement comes up they hold the IPR and they get the contract" *(Head of Industrial Participation, Case B)*. Likewise,

[38] Usually the Civil Aviation Authority (UK) or the Federal Aviation Authority (USA)

some electronic systems suppliers permit open integration between other manufacturers' products and their own but, "some say absolutely not, that's our software, you can't modify it without coming back to us and spending an awful lot of money" *(Head of Procurement Development, Case B)*. The technical specification of an item can also limit strategic options. "We have a lot of products where the specification means there is a single source and we have no choice. We may have had a multiple choice at the outset, but suppliers acquire other businesses and before you know it, you are sole sourced" *(Supply Chain Director, Case D)*. For example, "The Cobalt we deal with comes from one manufacturer, it's a special grade. So that does confine any strategy" *(Senior Sourcing Manager, Case D)*.

The purchasing organisation can also have low bargaining power relative to their supplier. A respondent from Case B explained, "We are a small player. We are not driving a lot of the supply chains; we are following them. Our position may be strategic to us, but in a lot of cases we are not strategic to the supplier" *(Procurement Manager, Case B)*. Respondents from the other cases concurred. "Company X can make our entire year's requirement of glass in half a shift… on one machine. If you can book it six months in advance, with a bit of luck and a fair wind, they might deliver it to you. We are very small fry in comparison to their other customers: television manufacturers, mobile phone manufacturers" *(Vice-President & General Manager, Case A)*. "The biggest problem we have is that we want one or two and they supply in hundreds" *(Quality Director, Case D).* "If your spend is only one or two percent of that business, you are such a small fish in such a big pond that you are not important to that supplier" *(Sourcing Manager, Case D)*.

As a result, it is often the supplier and not the purchasing organisation that has strategic alternatives available to them. One executive explained that a key supplier terminated their supply contract to focus on supplying their competitor instead. "We treated them as a supplier (rather than as a strategic partner), we drove huge additional cost into their business and they got really hacked off with that. So as the contracts came up for renewal they said thanks very much…" *(VP & General Manager, Case C)*. Unfortunately, the supplier's decision was also strategically advantageous to a competitor and costly while an alternative supplier was located and integrated into the supply chain. Suppliers have sometimes migrated along the supply chain with similar results. "They are working with us as a sub-contractor and then, the next minute, they are in as a supplier to our customer. That can confuse relationships that we have with the supply base as well" *(Head of Programme, Case B)*.

Consequently, supply strategy process needs to be aware of and possibly conditional on supply markets. The effect of market competition, commanding suppliers and low relative

bargaining power within the case studies reveals how, in addition to the effects of sectoral dynamics, supply markets can further curtail actors from strategically developing viable alternative sources of supply.

Background of Senior Actors

There were numerous examples in the cases of actors describing the supply function's role as being tactical or administrative. For example, the supply function's purpose was variously described by senior actors as being to negotiate terms and conditions *(Head of Aircraft Programme, Case B)*, merely concerned with tactical buying once the strategic pieces were in place *(Director of Supply Chain Integration, Case A)* and there "to get the bits in" from the supplier *(Vice-President for Engineering & Quality, Case D)*. One respondent explained that supply is seen as the function that comes along after the key decisions have been made to drive down costs and maintain product availability; it is not part of the strategic decision making process *(Key Supplier Account Manager, Case B)*. As a result, many actors within the supply function perceive their role to have little strategic value. As one chief buyer explained, "For the most part, we are more of a provider of a service than we are a strategic function" *(Chief Buyer, Case C)*.

The actors with most influence over supply strategy process were most often not from the supply function. Correspondingly, echoing research that highlights how senior management expertise influences the likelihood of selecting particular supply initiatives (Johnson et al., 2007b), most of the actors engaged in supply strategy process had a manufacturing background therefore came to the question of supply strategy from an manufacturing perspective. Embedded in a manufacturing paradigm, their world-view is of manufacturing strategy derived from business strategy, *supported* by supply activity (Barnes, 2002). Accordingly, while they recognise that there are important decisions to be made by the supply function, senior actors perceive the supply function to be chiefly a tactical activity that supports the short-term, product or programme needs of manufacturing operations. Outside of the product or programme team, what remains is the need to 'get the bits in' and to target cost reduction; commonly regarded as the primary strategic driver in the industry. This chiefly passive and supportive cost-reduction role has been previously noted as the role generally adopted by the supply function in firms that define their competitive advantage as cost-focused (Cousins, 2005).

What is observed in the case studies, therefore, is the manufacturing background of senior actors strongly influencing supply strategy content and process. In an environment in which competition is almost uniformly cost-focused, a broad scope of strategic supply initiatives might have been expected to try to achieve a competitive advantage. Instead, the

manufacturing paradigm of senior actors confines the scope of supply strategy content to the satisfaction of short-term product/programme objectives. For example, there is a general absence of long-term value creation initiatives such as the development of strategic supply relationships in the cases. Notably, none of the cases actively engaged in developing strategic supply relationships beyond dyadic interactions, even though forums such as the IMP Group have long asserted the importance of supply chain and network relationships in supply (Gadde et al., 2003, Moller and Halinen, 1999, Baraldi et al., 2007, Cousins and Spekman, 2003b).

6.2 Supply Strategy Process and Actors

Although empirical study (Chakravarthy and White, 2002) has robustly established that *business* strategy 'in practice' tends to exhibit a range of different processual aspects the absence of fieldwork in supply strategy - to date - means that theorizing retains a number of simplistic conceptual divisions. Supply strategy is presented as either a hierarchical extension of business strategy (Anderson and Katz, 1998, Monczka and Morgan, 2000, Nollet et al., 2005a) or an emergent phenomenon influenced by the unfolding and often unknowable supply and demand characteristics of the marketplace (Macbeth, 2002, Sebastiao and Golicic, 2008). Yet even a cursory examination of the research findings reveals – in line with the business strategy literature - that these conceptualisations reflect alternative but complementary aspects of the case studies. For example, Cases A and C combine characteristics of both classical and incremental strategy process, with supply strategy being formed 'top down' by senior management and also incrementally by programme/project teams. Similarly, while supply strategy process in Case B resulted predominantly from a pattern of incremental decisions taken by various actors, here too it can be argued that through the identification of the manufacturing task in the business strategy and the articulation of the marketing strategy, senior actors were able to interpret strategic priorities for the supply function. What is clear from the findings is that, just as the background of senior managerial actors provides an important contextual frame for strategic activity, the role of supply strategy actors is central to understanding how these different perspectives are integrated in practice. A more detailed exploration of this phenomenon is presented in section 6.4.

Strategy Process and Strategic Contribution

There remains a world of difference between an organisation having a supply strategy and supply performing a strategic function in the organisation (Ellram and Carr, 1994a). The contextual factors described above all act to reduce the opportunities for the supply function

to act strategically but in other settings these same factors could create the opposite conditions - i.e. a much larger opportunity or 'strategy space' in which actors from the supply function can formulate and implement supply strategy. Other, more pragmatic, variables also shape this space. For example, consider case C. Senior actors from engineering and operations formulated the make-buy decision - the basis of their decision was chiefly capacity planning with the goal of delivering optimum manufacturing asset utilisation. Accordingly, an item may be bought in when there is no free manufacturing capacity but brought back in-house when there is free manufacturing capacity. In other words, a key point of reference for their strategy process was the percentage of the total bill of materials that was to be bought in. This notion of strategic space also interacts with the supply strategy process. At one level this is unsurprising. If only 10 per cent of the total bill of materials - rather than say 75 percent - is to be bought in, there will be a different resource allocation process, different organisational priorities and therefore, a different opportunity to 'think and act' strategically in the supply function. More interestingly, in the case data there was clear evidence of a negatively reinforcing cycle; where the nature of the supply strategy process actually further reduced the strategic space. This generic cycle is represented in the figure below.

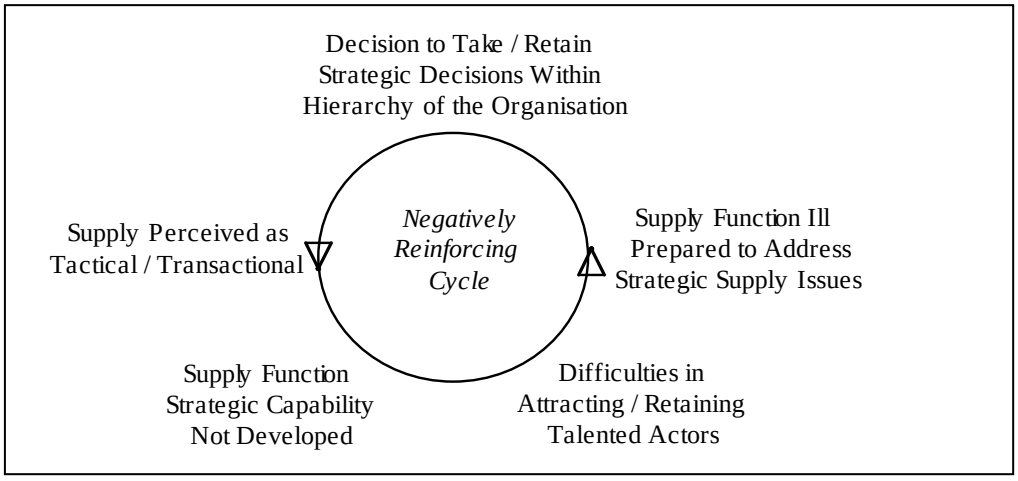

Figure 17. A negatively reinforcing cycle in the supply function

First, because of the constraints (no scope, conservative culture, command mode, etc.) the supply function fails to develop its own supply strategy process capability. The capabilities required of supply actors by the rest of the organisation are chiefly administrative and transactional and there are few remaining opportunities to act strategically. Consequently, administrative/transactional capabilities are the ones that are developed and delivered, rather

than supply strategy process capabilities. Then, the supply function encounters major difficulties in initially attracting and then retaining actors with aptitude and ability, who might otherwise develop strategic capabilities. Many supply actors possess the ability to think and act strategically (Procurement Marketing Manager, Case B) but these capabilities are generally under-exploited. "I've tried to have a small team thinking strategically, longer term planning […] In the heat of the battle they are always drafted into the frontline, pushing out purchase orders, getting parts in and guess what? We're in the same position next year and no further forward" (Procurement Director, Case B). As a result, the most able actors are often the most mobile. It was explained that "everybody wants good supply chain staff. It bothers me that they are so mobile. They never stick around long enough to bear the fruit of their labours. They are so influential on company profitability when you're 80 percent outsourced that it's a bit worrying the way they are all moving around so fast. They do some supply chain work, then go to be a programme manager" (European Vice-President for Electrical Power Systems, Case D). Case C, for instance, reported that it had experienced up to 40 percent annual turnover of staff in the supply function.

With little development of its own strategic capabilities and a difficulty in attracting and retaining the most able actors, the supply function is ill prepared to re-position itself as a credible driver of supply strategy process. It consequently remains a predominantly administrative and transactional function. Meanwhile, other functions and actors occupy the strategy space that the supply function fails to fill. "It's a self-fulfilling prophecy […] in that if you don't have a strategy to offer then others will naturally fill the vacuum. They will tell you what the strategy is because you have failed, as a function, to play your role in the game" *(Head of Procurement Development, Case B)*. In the absence of a credible alternative, the current paradigm is validated and sustained. In turn, the Command mode continues to drive strategy process behaviour and the sequence of steps contributing to the narrowing of the supply function's strategic autonomy continues.

Supply strategy actors

The literature is predominantly populated with analytical methodologies for formulating supply strategy (Bask, 2001, Ge et al., 2004, Hsu et al., 2008, Lambert, 1992, Lee, 2002, Martinez-Olvera and Shunk, 2006, Rajagopal and Bernard, 1993, Seifert et al., 2004, Virolainen, 1998, Kraljic, 1983). The case data suggests, however, that formal analysis is neither the exclusive, or even primary, mode of supply strategy formulation. Moreover, although the actor's role in supply strategy has long been acknowledged (Farmer, 1978, Finkin, 1988), there is only a very limited literature that advocates considering strategy, resources, activities and actors together (Gadde et al., 2003, Macbeth, 2002). This is a

particularly significant gap because – as distinct from corporate strategy but in common with other functional strategies - actors engaged in formulating supply strategy are much more likely to also be responsible for managing its implementation. In order to research the interaction of actors and strategy process, therefore, an *Integrative Framework* (Hart 1992) was adopted assimilating the main themes in the strategy process literature with the praxis and practice of actors, that classifies five modes of supply strategy process; the Command, Symbolic, Rational, Transactive and Generative modes.

Command as the dominant mode

Although the cases illustrate that the five modes of supply strategy formulation are not mutually exclusive, i.e. supply strategy formulation in one mode does not preclude concurrent praxis associated with potentially multiple additional modes, there was clear evidence of the impact of contextual factors in the apparent dominance of the Command mode. This is explained – at least partially - by the research setting, sectoral dynamics, supply markets and the background of senior actors discussed above. The aerospace sector is also strongly connected with the military and many actors were once military personnel, who brought with them a command and control management style; key decisions such as make-buy will, therefore, have been assigned to specific actors or teams. Interview participants would commonly explain, "make-buy rests with the VP of Operations and Supply Chain" *(Supply Chain Director, Case D)* or "we have a make-buy at the start of each programme" *(Sourcing Manager, Case C)*. The relatively slow industry clock-speed and the long lifespan of programmes, sometimes spanning decades, also foster a conservative approach to strategic management issues. As described by two managers in Case B, "I've come up against various bits of resistance because the company is very risk averse, fairly set in its ways" *(Procurement Marketing Manager, Case B)*. "We don't appear to take decisions on a balanced view. We take them with the view that we'll probably screw it up and it will be difficult" *(Head of Procurement Operations, Case B)*. Adoption of the Command mode by the focal company and/or their parent company is also a plausible response to an outer context that is highly regulated - "The CAA and FAA have a big influence on what we do and how we inspect and test our product, so we have to push that down into our supply chain" *(Director of Electrical Power Systems, Case A)* - or dominated by powerful customers and in which organisations may conclude they have few other available responses - "It's no longer a buyer's market, the seller has a large sway" *(Sourcing Manager, Case C)*.

In corporate strategy research (Chaffee, 1985) it has been proposed that strategy making follows a hierarchy reflecting underlying strategic capability, in which initial linear strategic planning becomes subsumed within more complex adaptive strategies. Pursuing this logic,

the Command mode could be considered as the least complex mode relative to the other modes; using as the basis of comparison the Command mode's emphasis on more centralised management control and its consequent lesser requirement for broad-based and adaptive formulation routines, procedures and information flows. Given its lesser complexity but its dominance in all four of the research cases, the Command mode could be viewed as the basic building block on which the other four, more complex modes are formulated. This assertion also develops the previous discussion of a relative lack of strategic capability amongst supply actors.

Patterns of modes

Although there was no evidence of any subsequent strategy hierarchy – no observations of sequential progression from one mode to another[39] - there were some discernable patterns of modes. The underlying complexity and degree of perceived risk associated with the supply task, for example, appears to influence mode. Specifically, the Transactive mode features strongly in combination with the Command mode (i.e. driven by a leader and/or a small team) for example, in those cases where there is a relatively broad and technically complex supply portfolio that requires extensive technical knowledge and a high degree of co-ordination. "We all sit down as a group and we will agree what the business priorities are. Okay, so what does it need to be, does it need to be done quickly? We will then create, for want of a better word, a scorecard which factors each element of that" *(Sourcing Manager, Case C)*. This suggests a logically consistent interaction – echoing Mintzberg's deliberate/emergent strategy process model – where the embedded level of task complexity requires detailed formulation and implementation to be continually resolved amongst all supply actors – even in a situation where senior actors set the broad 'direction of travel'.

In the case analysis, those activities that are recognisably associated with supply strategy divide broadly into three categories: long-term strategic decisions, patterns of short-term tactical transactions and (between these two positions) commodity strategy. Although senior actors (i.e. general managers, programme managers, vice-presidents, etc.) tended to be engaged, albeit sporadically, with long-term strategic decisions and more junior actors tended to be occupied with more tactical matters, the Rational mode was more prevalent in these 'lower level' formulation/implementation processes. SWOT analysis, supplier assessment tools, portfolio matrices, scorecards, etc. were regularly applied to more tactical decisions. "We use SWOT analysis, Porter's 5 Forces, we do some brainstorming around

[39] Such that praxis would be observed associated with adjacent pairs of modes (i.e. Command-Symbolic; Symbolic-Rational; Rational-Transactive) and/or there would be an observable progression from the least complex Command mode to the most complex Generative mode.

technology and infrastructure requirements, we use quick win analysis; they are the typical tools we use" *(Operational Commodity Manager, Case D)*. One explanation for this phenomenon might be – once again given the lack of strategic capability - the challenge of applying an analytical approach to ambiguous and complex strategic situations. Alternatively, the dominance of the Command mode, in this specific context, creates / reflects a very clear power gradient where 'subordinate' junior actors need to utilise such tools to justify that the best course of action was taken. Of course, paradoxically, this may prove to be an essentially symbolic process in an environment where there may actually be few options as a result of the very constrained strategic space - in turn defined by high supplier / customer power, extensive regulation and complex technical considerations.

Chapter 7.

Research Conclusions

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Taking its operational unit of analysis as the actors engaged in the formulation and implementation of supply strategy, this research study is an empirical exploration of functional strategy process. The four studies represent two 'tiers' in the supply chain (OEM's and system integrator / manufacturers), each specifically selected, ex-ante, for their contrasting characteristics; i.e. their relative product complexity and the centralisation of their procurement activities. The citing of the study in the aerospace sector provided both stability in the research parameters and a rich source of case material.

7.1 Summation and Discussion

Although the 'principle' of supply strategy has long been championed (Aitken et al., 2003, Spekman, 1985, Farmer, 1976, Ellram and Carr, 1994a), the 'in practice' evidence of this single sector study is that the extent of participation by the supply function and its actor in the strategic planning processes of the firm is still highly variable. Moreover, the study also makes abundantly clear that the 'in practice' nature of supply strategy formulation and implementation is a multi-faceted phenomenon – dynamically shaped by a range of inter-related contextual, processual, content and actor-specific factors. Yet despite the richness of the subject, interest in strategy process is limited in the supply management literature; where supply strategy is discussed it is normally in terms of specific content (i.e. enabling technologies, organisational structures, boundary spanning activities, etc.). In marginalising such an important practical and theoretical concern, the literature offers limited insight regarding the fine distinctions in supply strategy process observed during this study. As an exploratory piece of research, using the adjacent strategy literature provides invaluable conceptual support and reinforces the need for alignment between theories in corporate and functional strategy.

Six specific conclusions emerge from the work. To ensure that a 'trail of evidence' is clearly evident from the literature and case data, through the processes of analysis and discussion to the six conclusions discussed in this section, Table 14 (overleaf) is presented to assist the reader. The table lists each of the conclusions in turn and cites the relevant sections in the data, analysis and discussion chapters on which the conclusions have been developed. Following the table each of the six conclusions is presented in detail.

CONCLUSION	DATA	ANALYSIS	DISCUSSION
Misalignment in the supply management literature	Chapter 2 – Literature Review pp29 – 30 and pp 40 – 42 & Chapter 4 – Case Studies	Section 5.1 Supply Strategy Content pp126 – 135. This section analyses the 'scope' of supply strategy content 'in practice' within the case interviews versus the breadth of supply content presented in the literature	Section 6.1 Supply Strategy Content and Context pp157 – 159. This section discusses the narrow focus of supply strategy content and interprets the misalignment with the literature
The effect of contextual factors on actors' strategic autonomy	Chapter 4 – Case Studies	Section 5.2. Supply Strategy Content and Context pp135 – 137. This section analyses the impact of contextual factors in the cases. Also, Section 5.4 Supply Strategy Process – Actors pp141 – 144 that analyses the actions of actors inside and outside the boundaries of the supply function in supply strategy praxis and practice	Contextual constraints on the supply strategy 'space' pp159-164. This section discusses the effect of sectoral dynamics, supply markets and the background of actors on the strategic autonomy 'space'
A call for a contingent view of supply strategy process	Chapter 2 – Literature Review p29, p41& Chapter 4 – Case Studies	Sections 5.2 Supply Strategy Content and Context plus sections 5.3, 5.4 and 5.5 pp135 – 146. These sections point to the moderating effect of process, actors and context on supply strategy content	Section 6.1 Supply Strategy Content and Context pp157 – 164 and Section 6.2 pp164 – 166 'strategy process and strategic contribution'. Section 6.1 discusses the interaction of context and content and Section 6.2 the interaction of process and actors, as illustrated by the 'negatively reinforcing cycle' illustrated in Figure 17
The interconnection of functional strategy formulation and implementation	Chapter 2 – Literature Review p46 & Chapter 4 – Case Studies	Section 5.4 Supply Strategy Process – Actors pp141 – 144. This section analyses which actors are engaged in the formulation and implementation stages of supply strategy process	Section 6.2 Supply Strategy Process and Actors pp164 – 168. This section discusses the role played by actors in supply strategy process within the case studies and highlights that the formulation and implementation stages are frequently disconnected 'in practice'

Dominant and secondary modes of supply strategy process	Chapter 4 – Case Studies	Section 5.6 Modes of Supply Strategy Process pp146 – 154. This section analyses the 'modes' of supply strategy process observed in the case studies	Section 6.2 Supply Strategy Process and Actors p167 'Command as the dominant mode'. This section identifies the Command mode as the most dominant in the case studies and discusses the reason for its dominance in the case material
Patterns in modes and practice	Chapter 4 – Case Studies	Section 5.6 Modes of Supply Strategy Process pp146 – 154. This section analyses the 'modes' of supply strategy process observed within the cases, the development of 'secondary' modes and the drivers of supply strategy modes	Section 6.2 Supply Strategy Process and Actors p168 - 169 'Patterns of modes'. This section discusses some discernable patterns of 'modes' of supply strategy process and the use of 'practices' associated with strategic decisions, tactical transactions and between these two, commodity strategy

Table 14. The provenance of the six research conclusions

Misalignment in the supply management literature

The dominant focus on supply strategy content defined by the literature is in excess of that likely to be addressed by most supply management practitioners. As a result, far from mirroring practice, the supply management literature seems to have both underplayed and outstripped it in its assumptions. One possible interpretation of these content misalignments is that many of the specific findings that manifest as too much breadth for the supply literature, actually reflect a failure to take sufficient account of context. There are 'content' findings that strongly align with the literature but more that do not. The conclusion to be drawn from this is that supply strategy content should only be evaluated in the light of an understanding of the context in which the supply strategy is to be realised. In evaluating empirical findings against the theoretical breadth of supply strategy content as represented in the literature, it is essential to understand that all content is not equal and that it is only when context is taken into account that the scope of content in a supply strategy can be appraised against the strategic objectives of the strategy.

With regard to research, the necessity to fully comprehend context argues in favour of single-sector research study designs and highlights the possible shortcoming of cross-sectoral studies, in which the contextual nuances of each sector might not be fully grasped. Discussion of 'best practice' in the supply management literature is impractical, for example, without a corresponding understanding of the context in which the practice is embedded and consequently, any extension of the study of supply strategy process across multiple sectors should note the need for a thorough exploration of the contingent factors present in each sector. While actors continue to be pressed by the supply management literature to act strategically, this study has also shown that *how* strategic supply decisions are made will impact the autonomy actors in supply have to act strategically. In turn, the extent of actors' strategic autonomy drives strategic content. It is, therefore, evident that it is necessary to actually engage with actors to be in a position to observe the complexity and subtlety of these interactions. A recalibration of future supply strategy process research in line with the wider 'practice turn' in social theory would, accordingly, enable further valuable contributions to the literature.

The effect of contextual factors on actors' strategic autonomy

While appraisal of supply strategy content is contingent on context, the opportunity / autonomy that actors have in supply to enact strategy process - i.e. the extent of their strategy 'space' - is also broadly determined by contextual factors. This study identified three such sets. *Sectoral dynamics* are a blend of conditions, particular though not necessarily unique to the aerospace sector, that constrain actors' strategic options. These include long product life cycles resulting in legacy and obsolescence issues, bespoke requirements and political lobbying that tie the focal company to specific sources of supply and attitudes to risk in an environment that is highly regulated and in which changing specifications and/or suppliers can result in costly 'requalification'. The peculiarities of *supply markets* and in particular relative 'power' in the buyer-supplier dyadic also operate to constrain alternative action. In general, buyers might be supposed to have strategic power over suppliers by virtue of their freedom to engage with and choose between sources of supply. However, in circumstances where a supplier holds key intellectual property rights in a supply market or controls access to rare commodities / technologies, or one in which the buyer has little economic bargaining power, a buyer's freedom to choose between suppliers will be restricted or even totally negated. Such single or limited source conditions afford a significantly reduced 'space' for strategic action. The third set of contextual factors identifies how the *background of senior actors* plays a part in defining a 'world view' that can affect how supply strategy is formulated and in turn, the content of supply strategy. In the case studies, the 'manufacturing paradigm' influenced senior actors' perception of supply as a supporting function to

manufacturing strategy, which engendered a generally short-term, programme / project centred, tactical and administrative role for the supply function.

The three sets of contextual factors contain parallels with Porter's 'five forces' framework in the business strategy literature, which was proposed to explain how an organisation's behaviour is affected by contextual forces in a competitive market (Porter, 1980). The premise of the framework is that stronger the power of buyers and suppliers and the stronger the threats of entry and substitution, the more intense competition is likely to be within the industry. In parallel with Porter's construct, the stronger the power of buyers and the greater the opportunity for the substitution of a channel of supply / commodity in the supply market, the greater the extent of the 'strategy space'. Nonetheless, the 'five forces' alone do not determine how firms will compete in an industry; the structure of the industry itself is also of key importance. Porter's framework is based on an economic theory known as the Structure-Conduct-Performance (SCP) model. This asserts that an industry's structure determines the competitive behaviour of organisations (i.e. conduct) that in turn, affects profitability (i.e. performance). Similarly, the *sectoral dynamics* identified by this study - e.g. long product lifecycles, political lobbying, highly regulated industry - determine the nature of strategic action (i.e. conduct) in the four case studies. The third set of contextual factors identified by this study - *the background of senior actors* – introduces the influence of actors on strategy process that is generally absent from the business strategy process literature.

A call for a contingent view of supply strategy process

The third conclusion to emerge from this study is that a more contingent view of supply strategy process is required, reflecting that although much of the supply management literature has sought to understand supply strategy by reference to its content, without an appreciation of the moderating effect of strategy process, actors and context on content, such descriptions are incomplete. In the case data for example, there was clear evidence of a negatively reinforcing cycle; where the nature of the supply strategy process actually further reduced the strategic space – whose boundaries were already constrained by the contextual factors discussed above.

To clarify, in the case studies supply strategy process was generally retained within the hierarchy of the organisation, driven by contextual factors and particularly by the view held by senior actors, that the supply function's role is tactical and administrative in support of the manufacturing strategy. The nature of strategy process, i.e. retained within the organisational hierarchy, has the effect of further reducing opportunities for the supply function to think / act strategically. Because of their day-to-day mainly transactional

responsibilities, the supply function subsequently fails to develop strategic capabilities and in turn, fails to attract or retain actors with strategic capabilities. The function is therefore largely ill prepared to engage with senior actors in supply strategy process when opportunities occur. As a result, senior actors' view of the supply as chiefly a tactical and administrative function is re-affirmed, supply strategy process is retained within the hierarchy of the organisation and the negative cycle is reinforced.

The identification of the negative cycle is significant in four respects. First, it demonstrates that while the boundaries of supply's strategic space are constrained by contextual factors, the nature of supply strategy process – how it is formulated and by whom – also influences the size of supply's strategic space. Second, the negative cycle shows how this further constraint of the supply function's strategic autonomy is held in place by a series of self-reinforcing factors. Third, the negative cycle offers an insight into how practitioners may develop supply's strategic space. For instance, supply practitioners might seek greater involvement in strategic supply decisions such as make-buy in order to demonstrate the function's strategic orientation. Likewise, the cycle might focus debate within the supply function about the capabilities and the actors required to disengage the cycle and exert an influence on the nature of supply strategy process. Finally, the negative cycle is a realisation that an understanding of supply strategy is contingent upon comprehending process, actors and context; a point not generally recognised in the mainly content focused supply management literature.

The interconnection of functional strategy formulation and implementation

In business strategy process the potential exists for the formulation and implementation stages of strategy process to be disconnected. Although most evident during the era of strategic planning, in business strategy there is still likely to be some 'distance' between the actors that formulate strategy – possibly senior management or dedicated strategists - and others – possibly middle-management – who implement the strategy. In common with other functional strategies, however, it might be supposed that supply strategy process would be more likely to engage the same actors in the formulation *and* implementation stages of strategy process. Consequently, to the actors involved the distinction between the formulation and implementation of supply strategy would be artificial 'in practice'.

The evidence of the four cases in this study is, however, that supply strategy process is predominantly analogous to business strategy. In other words, the formulation of supply strategy is retained in the hierarchy of the organisation, 'distanced' from the implementation of supply strategy within the supply function. It does not, therefore, generally engage the

same actors in the formulation *and* implementation stages of strategy process. The first conclusion drawn from this finding is that it validates the use of actors as a key variable in the analysis of supply strategy process. Analysis of the role of particular groups of actors in strategy process enables their engagement or non-involvement in the stages of strategy process to become evident. Second, at the functional level in the organisation, analysis of strategy process should be understood to embrace an investigation of both the formulation of strategy *and* its implementation, so that insight and findings can be developed concerning the stages of strategy process and the actors that participate. Third, an awareness of formulation and implementation in supply strategy process may assist practitioners in considering an appropriate balance of actor engagement throughout the hierarchy of the organisation. In instances such as the case studies, where supply strategy process is retained predominantly within the organisational hierarchy, consideration and awareness of this imbalance might assist a re-evaluation of supply strategy praxis.

Dominant and secondary modes of supply strategy process

In order to provide a preliminary structure for this explorative study, at the outset an *Integrative Framework* (Hart 1992) was adopted that assimilated the main themes in the strategy process literature with the praxis and practice of actors: the Command, Symbolic, Rational, Transactive and Generative modes of strategy process.[40] Following the subsequent analysis of the case data, it became evident that while concurrent praxis associated with multiple modes could be identified in the case studies, the dominant mode across all four cases was the Command mode.

The dominance of the Command mode has already been attributed, in part, to the contextual setting of the cases, i.e. the sectoral dynamics, the conditions within the supply markets and the background of senior actors. The dominance of the Command mode may, therefore, be viewed largely as the consequence of contextual conditions. However, while contextual factors such as a parent company's intervention might drive Command mode behaviour, the adoption of particular strategy process modes should also be considered, to some extent, to be a matter of processual choice. In other words, while the dominance of the Command mode in the case studies is largely a reflection of the impact of context on supply strategy process, the background of senior actors certainly plays a part in determining the Command mode, rather than any other, as the dominant 'choice' of mode. Furthermore, 'choice' plays

[40] Critiquing the use of the *Integrative Framework* in this investigation, the titles used by Hart for each mode could better represent the 'style' of strategy process described. For example, 'Analytical' might have been preferred to 'Rational'. Additionally, as with all frameworks and models, the 'modes' represent five 'types' which are good generalisations but do not always perfectly fit the specifics of a particularly case.

another part as actors in each case adopt a distinctive configuration of 'secondary' modes of supply strategy process:

- Case A is associated with the Command, Rational & Transactive modes
- Case B is associated with the Command & Transactive modes
- Case C is associated with the Command, Symbolic & Transactive modes
- Case D is associated with the Command & Rational modes

These configurations of 'secondary' modes might, consequently, be seen as actors responding to the impact of context by finding alternative modes of response and this explanation might go some way to account for the persistence of the 'secondary' modes of supply strategy process observed in the four case studies. While this study has been able to identify the presence of dominant and secondary modes in supply strategy process, however, such additional hypotheses would need to be tested by further work.

Patterns in modes and practice

Finally, although there was no evidence of any subsequent strategy hierarchy – no observations of a sequential progression from one mode to another - there were some discernable patterns within the combination of modes deployed within the cases. For instance, the underlying complexity and degree of perceived risk associated with the supply task appears to influence mode. In particular, the Transactive mode featured often with the Command mode in complex and highly technical supply scenarios, which as discussed above, seems to reflect actors' response to the impact of contextual factors and mirrors patterns of deliberate and emergent strategy process.

A pattern was also observed regarding the application of analytical tools, routines and procedures (i.e. 'practice'), generally by more junior actors to tactical supply decisions, while senior actors rarely utilised analytical practices in long-term strategic decisions. For instance, more junior actors in the case study interviews regularly cited their use of portfolio matrices, SWOT analyses and supplier selection models, whereas senior actors rarely identified supply strategy process with the utilisation of specific routines or procedures. This pattern may reflect the limitations of analytical tools applied to ambiguous strategic supply decisions, but their increasing utility to tactical supply decisions, or some other factor such as the application of 'formal analysis' to demonstrate a purely administrative audit trail of 'best practice' in supply practice. As an exploratory investigation, this study succeeded in discerning patterns in the application of modes and practice, however, the significance and reliability of this finding would need to be the subject of further research.

7.2 Implications for Practice

While the supply management literature continues to advocate the integration of 'supply' into the planning cycles of the organisation (Birou and Fawcett, 1997, Stonebraker and Afifi, 2004), this study has shown that the opportunity and facility to think / act strategically is dependant upon more than just resolve and motivation; it is the product of a complex interaction of strategy context, content, process *and* actors. As distinct from business strategy, an appreciation of an appropriate balance of actor engagement throughout the hierarchy of the organisation, in both the formulation and implementation of strategy, is also facilitative.

Most importantly for practice, the effect of modes(s) of supply strategy process on the supply function's strategic autonomy should be understood. Specifically, that the strategy 'space' is defined by the way strategic supply decisions are formulated and who makes the decision. Reflecting the context in which they are embedded, certain modes such as the Command mode may be predominant in an organisation. Supply actors may, therefore, experience difficulty in engaging in supply strategy process that is retained within the hierarchy of the organisation and sustained by a negatively reinforcing cycle. This study has demonstrated, however, the potential of supply actors to develop distinctive combinations of 'secondary' modes to counteract the influence of context. In particular, the cases demonstrated the frequent combination of the Interaction mode of strategy process with the Command mode in complex and highly technical supply scenarios, which makes the development of strategy process capabilities possible outside of the hierarchy of the organisation.

The development of strategy process capabilities is a significant implication for practice. While actors outside of the supply function control the make-buy decision there can be little, if any, opportunity for the supply function to act strategically and contribute to the strategic goals of the organisation. If supply actors are to disengage the negatively reinforcing cycle that retains supply strategy process within the hierarchy of the organisation, the litmus test for supply's involvement in the strategic processes of the firm might be supposed to be the function's active engagement in the make-buy decision. Make-buy is not just a decision of course; a nuanced view of actors and process – evident in the cases – suggests the challenge of shifting senior actors (including systems, structures and the corresponding strategic space) out of the manufacturing paradigm that persists in many organisations that no longer manufacture the majority of their finished product by value. However, a richer set of insights

will help actors recognise the limitations and impact of such a dominant strategic logic and encourage the transition to a supply *and* operations paradigm.

7.3 The limitations of the research study and further work

The relatively small number of research cases chosen by this study, although within the bounds of previous practice, suggests a possible limitation in the external validity of the findings. Although due care was taken in the selection of the cases, research within a broader sample of aerospace companies would produce new findings that might support and/or conflict with the findings of this study and thereby lead to an enhancement in the external validity of the conclusions. To remedy this limitation this study might, therefore, be subsequently extended within the aerospace sector, possibly using questionnaires developed from the findings to greatly broaden the scope of data collection and the number of organisations engaged in the research.

The possible uniqueness of conditions in the aerospace sector does, however, potentially limit the generalisability of the research conclusions; all four of the research cases were deliberately located within the aerospace sector to counteract the problems associated with cross-case comparison. This limitation of the research conclusions would not be addressed by simply extending the research within aerospace, so further work might include extending the research beyond aerospace to other industrial sectors. Other industries that manufacture high technology products, such as automobile, electronics / IT or other multifaceted systems manufacturing, are likely have many broadly similar characteristics to the aerospace sector and this would facilitate cross-sector comparison. Alternatively, sectors with polar opposite characteristics might be selected to test the extremes to which this study's conclusions might be generalised. To ensure an appropriate span of sectors in accordance with the aims of any further work, factors such as a sector's 'clockspeed', the complexity of its supply markets and/or its consumer versus business customer focus might be used as the basis for comparison. Likewise, the cases within the chosen sectors might be selected to represent both similar and different characteristics, such as the degree of their product complexity, the extent to which the supply function is centralised, the size of the organisation and/or the organisation's position within the supply chain.

While the focus of this research was the exploration of supply strategy process in which contextual factors were considered, a further potential limitation of this study is that no meaningful attempt was made to link process to outcomes. The suggestion is that variations in context and process shape outcomes and linking the analysis of process to the observation

of an outcome, for example an organisation's financial performance, would provide an opportunity to understand how and why this occurs. In respect of functional strategy process research, however, the difficulty lies in establishing an unequivocal causal relationship between functional praxis and business performance or some other outcome. If appropriate outcomes and measures could be identified, however, further research might explore how and why supply strategy process shapes outcomes in different contexts. For instance, adapted from work on supply chain performance (Otto and Katzab, 2003), further work might consider utilising alternative outcomes from varying perspectives (see table below).

PERSPECTIVE	OUTCOME DEFINITION	SUGGESTED MEASURES
System Dynamics	Managing trade offs along the supply chain	Capacity utilisation Cumulative Inventory level Stock outs Time lags
Operations Research	Calculating optimal solutions within given degrees of freedom	Logistics cost per unit Service level Time to deliver
Logistics	Integrating generic processes sequentially, vertically, horizontally	Integration Lead times Order cycle time Inventory level Flexibility
Marketing	Segmenting products & markets. Combining them using the right distribution channels	Customer satisfaction Distribution cost per unit Market share / channel costs
Organisation	Determining and mastering the need to coordinate & manage supply relationships	Transaction costs Time to network Flexibility. Density of relationships
Strategy	Merging competencies & relocating into the deepest of the profit pool	Time to network Time to market ROI of focal organisation

Table 15. Six perspectives and measures of supply outcomes

Finally, the Integrative Framework of Strategy Making Processes (Hart, 1992) on which much of this research is based assimilates the main themes in the strategy process literature with the praxis and practice of actors. However, the framework only offers five modes: Command, Symbolic, Rational, Transactive and Generative. Further work might be dedicated to developing a more nuanced Integrative Framework capable of distinguishing between a larger number of supply strategy process modes, and assimilating additional / alternative themes in the literature. In a longitudinal study it might also be possible to include within the Framework a capability to track the evolution of patterns of modes as they

evolve within cases over time and importantly, to analyse the critical events that might act as the catalysts for such progression.

APPENDICES.

Appendix 1.

Examples of normative concepts in the 'content' literature

(Korpela and Tuominen, 1996)	A process based decision aid for warehouse site selection
(Zinszer, 1996)	A conceptual model of alternative responses available to practitioners to deplete excess inventories
(Ng et al., 1997)	The concept of time-based competition to establishes time as the primary competitive variable
(Blatherwick, 1998)	Addresses the concept of vendor-managed inventory
(Li and O'Brien, 2001)	Introduces a mathematical model to match types of products to supply chains
(Duclos et al., 2003)	Presents a model of supply chain flexibility
(Holweg, 2005)	Develops a conceptual model of key factors that determine the responsiveness of a supply chain
(Stevenson and Spring, 2007)	Presents a definition of flexibility in the context of supply chains
(Wikner et al., 2007)	The concept of a customer order decoupling point to reduce complexity in managing the supply chain

Appendix 2.

'Purchasing' topics addressed by empirical study

(Lamming and Hampson, 1996, Min and Galle, 1997)	Environmentally friendly or 'green' purchasing strategy
(Wei and Chen, 2008)	The use of TCE in the selection and implementation of purchasing strategy in various scenarios
(Sadrian, 1994)	Decision support systems to find 'the best' purchasing strategy where business volume discount is an obstacle
(Nollet and Beaulieu, 2003)	Critical factors in the development of purchasing groups
(Caniels and Gelderman, 2005)	How power and dependence between buyers and suppliers influences the choice of purchasing strategy in portfolio models

Appendix 3.

Empirical logistics articles in the 'content' supply strategy literature

(Vernimmen et al., 2008)	Presents a review of previous research into stochastic inventory models and explores a case study.
(Mollenkopf et al., 2007)	Considers theory development related to returns management within supply strategy and investigates the marketing/logistics relationship in five Italian firms.
(Baker, 2004)	Uses survey data to determine the extent to which modern supply theory and distribution centres are aligned.
(McGinnis and Kohn, 2002)	Considers whether process, market, and information strategic orientations are interrelated and how logistics priorities, competitive responsiveness, and external environmental hostility affect logistics strategy.
(Kohn and McGinnis, 1997)	Compares the use of third-party logistics (3PL) services by American manufacturers from 1991 to 1995.
(Perry, 1996)	Describes the approach taken by UK retailer B&Q in deciding on the appropriate level of warehouse automation.
(Fuller et al., 1993)	Asserts the goal of logistics strategy to be the building distinct approaches to distinct groups of customers and proposes a process to achieve this.
(Crum and Allen, 1990)	A study of the potential impacts on the motor carrier industry of three logistics strategies.
(McGinnis and Kohn, 1990)	Investigates whether logistics strategies can be empirically identified. From the data obtained, four specific logistics strategies were identified.

Appendix 4.

Examples of fieldwork 'content' literature in specific contexts

REFERENCE(S)	CONTEXT	DETAIL
(Helper, 1991)	USA – automobile manufacturing	Describes the automobile industry in the United States, the negligence of purchasing strategies and relationships between automakers and suppliers
(Hoffman and Mehra, 2000)	USA – food retailing	Discusses efficient consumer response as a supply strategy in grocery businesses by five major grocery operations in the USA
(van der Vorst et al., 2001)	Food production	Hybrid supply strategies and the decoupling point are applied to a poultry supply chain experiencing high demand uncertainty in an inflexible production environment
(Stephens and Wright, 2002)	UK - food retailing	Explores physical distribution issues through research in the UK food retailing industry
(Sahay et al., 2003, Sahay et al., 2006, Sahay and Mohan, 2003)	India	Describes the current architecture of supply chains in India and their alignment with business strategy
(Tsang, 2003)	Information technology	Describes the strategies of successful IT firms in Europe between 1977-99
(Rantala, 2004)	Horticulture – Finland	Explores an integrated production-distribution system design problem in the supply chain of a Finnish nursery
(Wilson et al., 2004)	USA - grain production	Evaluates the effects of random factors on logistical costs in the grain supply chain
(Mollenkopf and Dapiran, 2005)	Australia and New Zealand	An Australia and New Zealand survey to ascertain the level of logistics competency in firms and their approach to logistics strategy
(Birtwistle et al., 2006a, Birtwistle et al., 2006b)	Scotland – textiles	Explores SCM & quick response issues in the Scottish textile industry
(Hong et al., 2006)	China	Shows four types of Chinese market penetration and development, in terms of foreign management control and level of foreign ownership
(Wagner and Alderdice, 2006)	Scotland - fish production	A case study of a supply chain strategy for specialist fish producers
(van Donk and van der Vaart, 2007)	Semi-conductors	Applies a model of responsiveness (Holweg, 2005) to analyse cases in the semi-conductor industry
(Barker and Naim, 2008)	UK – construction	Evaluates the status of supply chain awareness in the house building industry

Appendix 5.

Normative frameworks for developing supply strategy

Framework	**Reference**
Advises how management can recognise supply weakness and treat it with a comprehensive strategy to manage supply. Proposes a purchasing portfolio matrix	(Kraljic, 1983)
Proposes a methodology for establishing a logistics / customer service strategy based on a thorough understanding of end-customer requirements	(Lambert, 1992)
Examines the objectives of purchasing activities to determine the contribution of strategic approaches to the procurement process and propose a framework for the development of a competitive purchasing strategy	(Rajagopal and Bernard, 1993)
Creates a general framework for procurement strategy formulation and in particular, presents how to create and implement a procurement strategy	(Virolainen, 1998)
Focuses on alternative supply strategies and their relationship to different types of third-party logistics services. A normative framework for organizing these relationships is developed	(Bask, 2001)
Analyses the uncertainties of supply and demand faced by the firm to develop a framework for selecting the right strategy for particular products	(Lee, 2002)
Relates product characteristics to supply chain strategy and adopts supply chain operations reference (SCOR) model level I performance metrics as the decision criteria	(Ge et al., 2004)
Develops mathematical models that determine the optimal order quantity to purchase via forward contracts and spot markets. The approach can be used by decision makers to determine optimal procurement strategies based on key parameters	(Seifert et al., 2004)
Presents the rationale and principles of a customer-product-process-resource framework for the simultaneous analysis of the business, supplier, manufacturing, planning, marketing and customer dimensions of a supply chain strategy	(Martinez-Olvera and Shunk, 2006)
Develops an integrated supply chain strategy for products with a short lifecycle and variable selling price, to entice cooperation between the supplier and the buyer	(Hsu et al., 2008)

Appendix 6.

Supply strategy process articles set aside in the review of fieldwork contributions.

REFERENCE	TOPIC OF THE STUDY	SUPPLY ISSUE(S) RAISED
(Degraeve and Roodhooft, 1999)	An empirical study into the use of a mathematical model which makes it possible for actors to objectively evaluate alternative purchasing strategies	The role of total cost of ownership information in supplier selection and supply strategy
(Cohen et al., 2000)	An empirical case detailing the thinking that turned supply-chain innovation into brand loyalty	The opportunity to match supply strategy to the urgency, or criticality, of customer's needs
(Mason-Jones et al., 2000)	Lean business processes, Agile manufacturing and supply	The necessity to match supply strategy design to the contextual needs of the marketplace
(Hokey and Galle, 2001)	An empirical study of purchasing practice in US firms that reported a greater environmental concern	Factors that inhibit or promote the formulation of ecologically aware supply strategy
(Sakaguchi et al., 2004)	An evaluation of a supply chain model for small and medium size enterprises	The role of dependency theory and information technology as facilitators of supply chain integration
(Slone, 2004)	A case study of a turnaround within the supply chain organisation at white goods manufacturer, Whirlpool	The requirement to formulate a supply strategy to satisfy the needs of consumers at the end of the supply chain
(Cagliano et al., 2006)	An empirical investigation into two supply chain integration dimensions (the integration of information flows and the integration of physical flows) and two manufacturing improvement programmes (lean production and enterprise resource planning systems)	How to establish clear links between supply strategy and internal manufacturing strategy
(Gelderman and Semeijn, 2006)	Managing a global supply base through purchasing portfolio management	How to leverage knowledge on global sourcing across corporate subsidiary companies
(Ro et al., 2007)	Presents research on modularity, as part of a mass-customisation strategy to achieve build-to-order operations and an efficient supply strategy	The need for the firm or supply network infrastructure to enable supplier relationships
(Schnetzler et al., 2007)	Presents a method for the systematic formulation and implementation of a supply chain strategy that creates value for the firm, aligns the supply strategy with the business context and supports the business strategy	Cites the benefits of the approach to be (1) it is a structured methodology to align supply strategy, corporate strategy and the business context, (2) it aids identification of root causes from symptoms and (3) enables an understanding of how sustainable improvements can be achieved
(Khan et al., 2008)	The empirical impact of product design on supply chain risk	How to incorporate product design considerations in the development of global supply strategy
(Miemczyk and Howard, 2008)	A study of a supply strategy based on build-to-order production that needed to be re-formulated as the company grew sales globally	The extent of actors' autonomy to act strategically in supply
(Hilletofth, 2009)	Describes how two Swedish companies developed and deployed supply strategy, particularly focussing on how different manufacturing strategies such as make-to-stock and make-to-order informed the strategy.	Proposes a four-step model for formulating a differentiated supply strategy consisting of developing a segmentation model, understanding the market, understanding the firm's capabilities to supply the market and developing supply solutions

Appendix 7.

The theoretical scope of the supply strategy content literature

Strategic Supply Management
Strategic Networks
Control in the supply chain
Time-based strategy
Strategic Sourcing
Vertical integration
Make-buy / lease-buy / outsourcing
Core competencies focus
Supply network design
Strategic alliances
Strategic supplier segmentation
World-class manufacturing
Strategic supplier selection& performance evaluation
Global strategy
Capability development
New product development

Logistics
Integration of materials & information flows
JIT, MRP,waste removal, VMI
Physical distribution
Cross docking
Logistics postponement
Capacity planning
Forecast information management
Distribution channel management
Planning & control of materials flow
Inventory & production management
Transportation

Relationships / Partnerships
Relationship development
Supplier development
Strategic supplier selection
Vertical disintegration
Partnership sourcing
Supplier involvement
Supply / distribution base integration
Supplier assessment (ISO)
Guest engineering concept
Design for manufacture
Mergers, acquisitions, joint ventures
Strategic alliances
Contract view, trust, commitment
Contracting & contract management
Partnership performances
Relationship marketing
Supply chain issues (i.e.beyond dyadic relationships)
Quality issues
Legal & regulatory issues
Certification

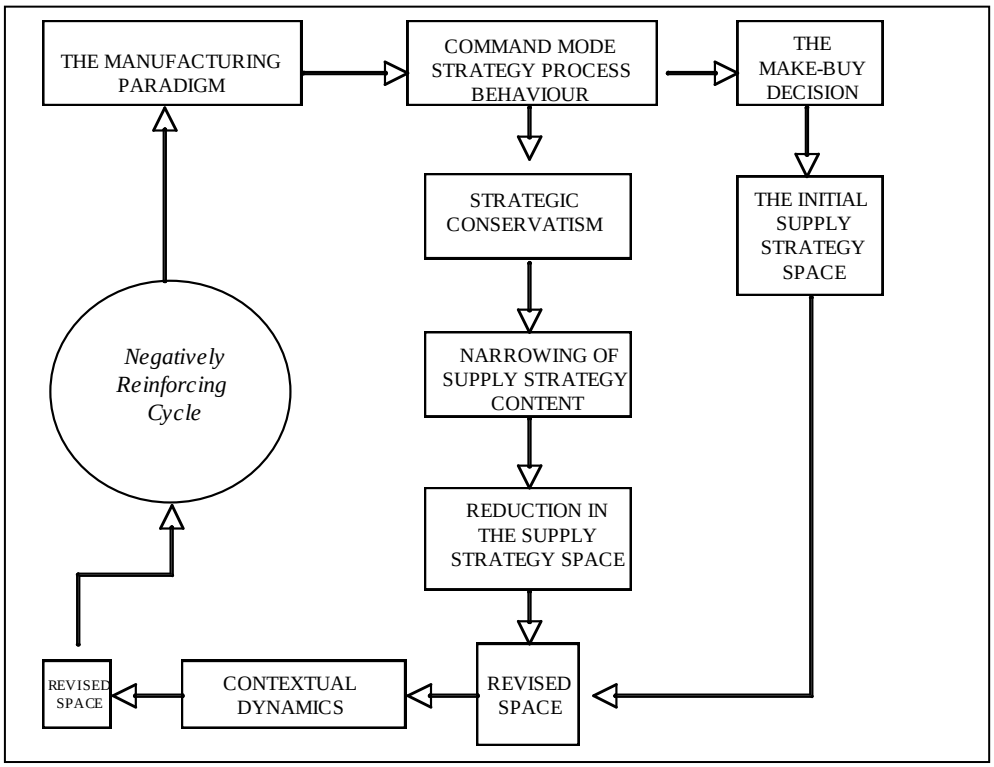
Best Practice
JIT, MRP, MRP II
Continuous improvement
Tiered supplier relationships
Supplier associations
Leverage learning network
Quick response time, time compression
Process mapping, waste removal
Physically efficient versus market orientated supply chains
WWW /e-commerce
Computer applications & EDI

Organisational Behaviour
Communication
Human resource management
Employees' relationships
Organisational structure
Power in relationships
Organisational culture & learning
Technology / knowledge transfer
Ethics
Social responsibility
Education

Purchasing
Strategic purchasing
Purchasing strategy & strategic impact
Capital equipment purchasing
Government, academic, institutional purchasing
Healthcare purchasing
Evaluating purchasing performance
International / global purchasing
Services purchasing
Purchasing organisation, teams, & internal relationships
Buyerbehaviour
Negotiations
Competitive bidding
Cost / price analysis
Cost reduction

Appendix 8.

An early conceptualisation of the research findings



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